GHTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

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THE IRON AGE

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THE practically complete line of steel products manufactured by Jones & Laughlin offers distinct advantages to buyers who realize the safety which lies in uniform quality, and the economies which may be derived from concentrated purchases.

The uniform quality of J & L Steel Products is the result of complete ownership-control exercised by Jones & Laughlin over all raw material and processes of manufacture, from iron ore to finished products.

JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS

JONES & LAUGHLIN BUILDING, PITTSBURGH, PENNSYLVANIA

Sales Offices: Atlanta Boston Buffalo Chicago Cleveland Cincinnati Dallas Denver Detroit Erie Los Angeles Memphis Milwaukee Minneapolis New York Philadelphia Pittsburgh St. Louis San Francisco

Warehouses: CHICAGO CINCINNATI DETROIT MEMPHIS NEW ORLEANS PITTSBURGH

Canadian Representatives: JONES & LAUGHLIN STEEL PRODUCTS COMPANY, Pittsburgh, Pa., U. S. A. and Toronto, Ont., Can.

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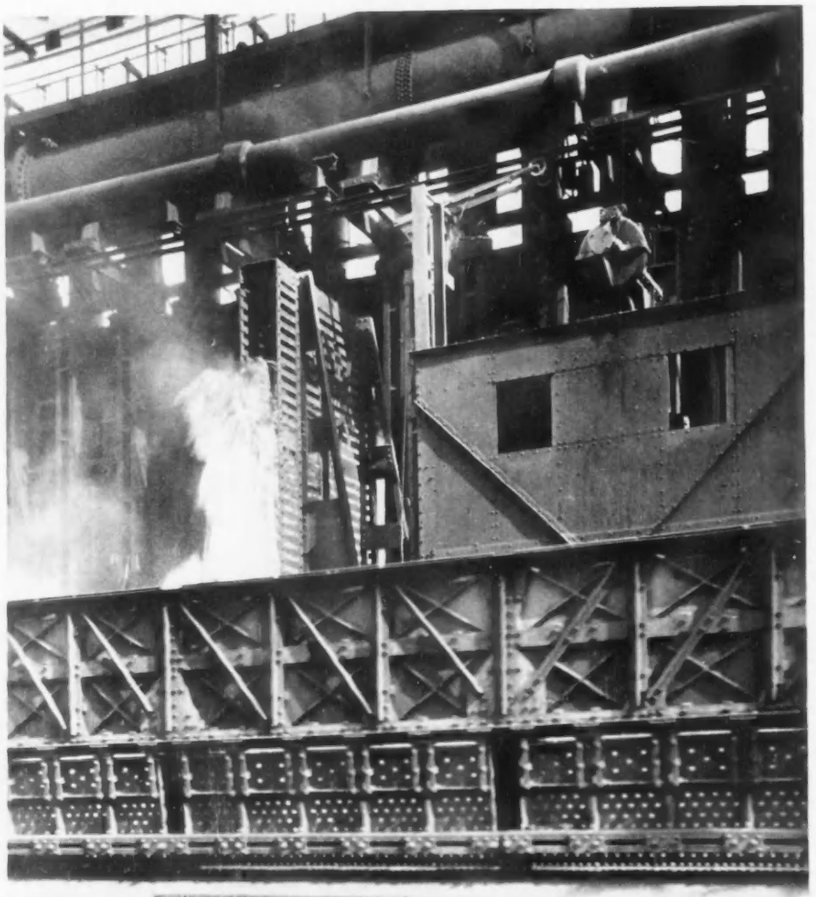


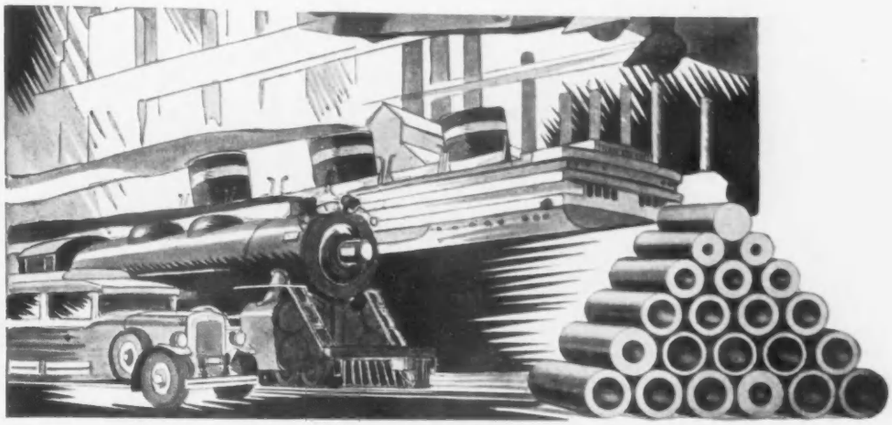
- Savings Made by Robbing Machinery of Adequate Maintenance Are Not Part of an Intelligent Coke Plant Economy. A Part Allowed to Depreciate to Ultimate Worthlessness Can Easily Jeopardize Investments of Many Times Its Cost In Related Equipment.
- Let Us Quote You on the Repair Parts Necessary to Keep Your Plant in Sound Operating Condition.
- KOPPERS CONSTRUCTION COMPANY
  Pittsburgh, Pa.

RESTORE • REPAIR • REPLACE •

BECKER OVENS

THE IRON AGE, published weekly by the *IRON AGE PUBLISHING CO.*, at 239 W. 39th St., New York, N. Y., U. S. A. Entered as second class matter June 18, 1879 at the Post Office at New York under the Act of March 3, 1879. $6.00 a year in U. S.; Canada $8.50, Foreign $12.00. July 7, 1932. Vol. 130, No. 1.

ELEPHANT BRAND
Phosphor Bronze
"PHOSPHOR BRONZE"
REG. U.S. PAT. OFF.



ELEPHANT BRAND

Phosphor Bronze in All Modern Industries

Quality is the Best Assurance of Satisfaction

BUSHINGS

Cast in the Rough 12" long. Carried in Stock

Outside Diameter	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	SOLIDS Size	SOLIDS Lbs.
1"	1/2" 2 1/2			SIZE OF CORES					SIZE OF CORES								SIZE OF CORES		1/2"	3/4
1 1/4"	5/8" 2 1/2	1/2" 3																	5/8"	1 1/4
1 1/4"	3/4 3	5/8" 3 1/2	1/2" 4																3/4"	1 3/4
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3 3/4"					2 3/4" 20	2 5/8" 22 1/4	2 1/2" 24 1/2	2 3/8" 26	2 1/4" 28	2 1/8" 29	2" 30 1/2	1 3/4" 36 1/2							3 1/2"	38 1/4
3 7/8"					2 7/8" 22 1/2	2 3/4" 21 1/2	2 5/8" 23 1/2	2 1/2" 26 1/2	2 3/8" 28	2 1/4" 29 1/4	2 1/8" 31	1 7/8" 38							3 3/4"	43
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5"							3 3/4" 34 1/4		3 1/2" 39 1/2		3 1/4" 45	3" 49 1/2								
5 1/4"							4" 38 3/4		3 3/4" 43 1/2		3 1/2" 48 3/4	3 1/4" 54								
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6 1/2"									5" 57 1/2		4 3/4" 65 1/2	4 1/2" 73 1/4	4 1/4" 80 1/2							
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7 1/2"											5 3/4" 77 1/4	5 1/2" 86 1/2	5 1/4" 95 1/4	5" 104						
7 3/4"												5 3/4" 90	5 1/2" 99	5 1/4" 108	5" 116					
8"												6" 93	5 3/8" 104	5 1/2" 112	5 1/4" 122					
8 1/4"												6 1/4" 96	6" 107	5 3/4" 116	5 1/2" 126					
8 1/2"												6 1/2" 99	6 1/4" 110	6" 119	5 3/4" 130					
8 3/4"												6 3/4" 103	6 1/2" 114	6 1/4" 125	6" 135					
9"													6 3/4" 118	6 1/2" 129	6 1/4" 139	6" 149				
9 1/4"													7" 121	6 3/4" 133	6 1/2" 144	6 1/4" 154				
9 1/2"													7 1/4" 125	7" 137	6 3/4" 148	6 1/2" 159				
9 3/4"													7 1/2" 129	7 1/4" 141	7" 153	6 3/4" 164				
10"													7 3/4" 133	7 1/2" 145	7 1/4" 158	7" 169				
	THICKNESS OF WALL								THICKNESS OF WALL								THICKNESS OF WALL			
	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"	1"	1 1/4"	1 1/4"	1 3/8"	1 1/2"				

THE PHOSPHOR BRONZE SMELTING COMPANY

2200 WASHINGTON AVE., PHILADELPHIA, PA.

INGOTS CASTINGS RODS WIRE SHEETS TUBING ROPES

19477

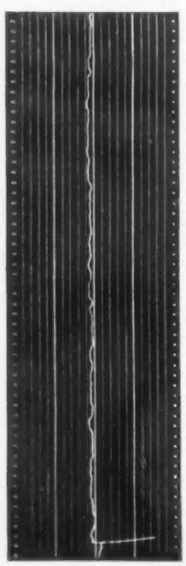
HERE'S A NEW HELICAL GEAR CHUCK

AND PROOF OF ITS PERFORMANCE

Helical gears held in the new Cimatool Bolender helical-gear chuck while being ground on the bore met the concentricity test at the pitch line within .001" as indicated by the Fellows' "Red Liner" Chart illustrated herewith. The gear-face run-out was also closely limited.

This close control of face or hub run-out is obtained mechanically even on narrow helical gears which have been troublesome heretofore.

This is possible by a *new feature* consisting of three adjustable fingers (shown between the pin jaws) which swing over the front end of the teeth and hold the gear back against locating surfaces before the jaws clamp the gear.



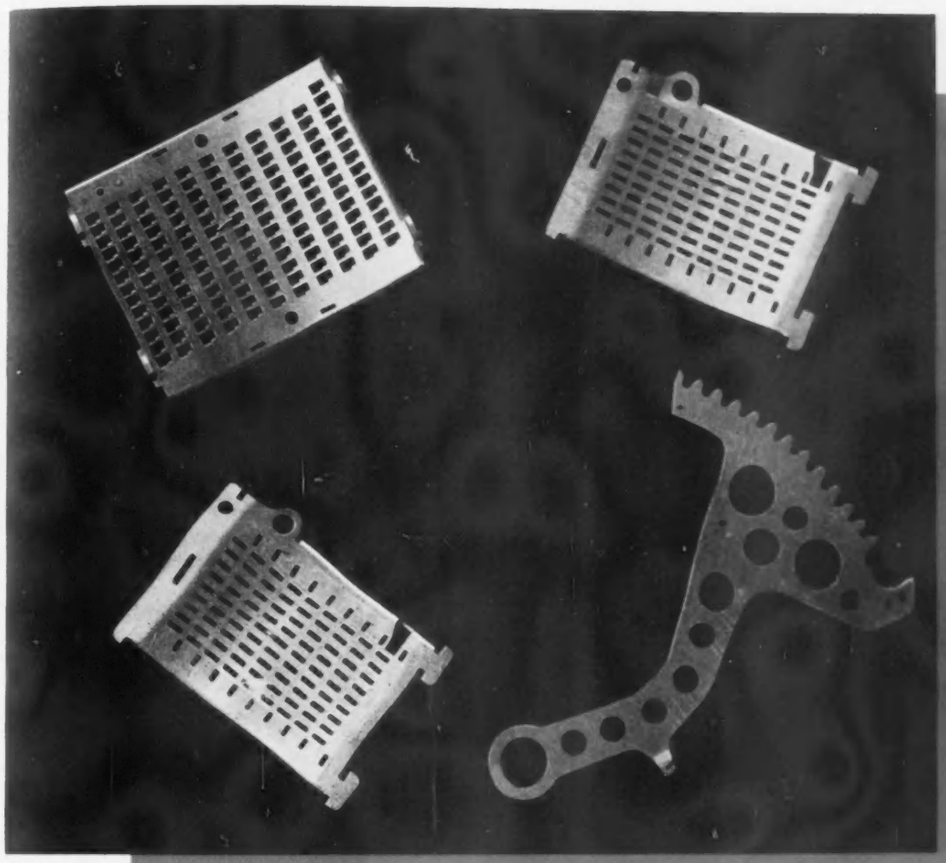
Otherwise the new helical gear chuck is built on the same sound principles as the preceding Bolender spur gear chucks which have maintained their accuracy after 15 years of daily service. This new chuck will also handle spur gears.

It will give you high production on helical gear bore grinding or precision boring, and its accuracy will eliminate rejects on this operation. Let us give you the full story.

CITY MACHINE & TOOL WORKS

GRINDING • BORING • INSERT CHAMFERING • BURNISHING • DIAMOND BORING • SPECIAL MACHINES

EAST THIRD AT JUNE — Cimatool — DAYTON, OHIO, U.S.A.



Illustrating a rather intricate blanking and piercing operation that was accomplished perfectly by Vasco Non-Shrinkable

VASCO NON-SHRINKABLE

Vasco Non-Shrinkable is an oil hardening steel with the ability to retain its exact size and shape after hardening and tempering.

Non-Shrinkable is recommended for taps, reamers, broaches, gauges, hobs, master tools, thread rolling dies, stamping and blanking dies and for a multitude of other tools where exact size and shape must be maintained and also where uniformity, strength, durability and cutting qualities are of paramount importance.

TRADE VASCO MARK — NON-SHRINKABLE Die Steel — VANADIUM ALLOYS STEEL CO. LATROBE, PA.

This is one of the steels completely described in a technical booklet of limited edition, entitled "Die Steels." It will be sent to operative executives who write for it on their official letterhead.

VANADIUM-ALLOYS STEEL CO.

LATROBE • • • • PA.

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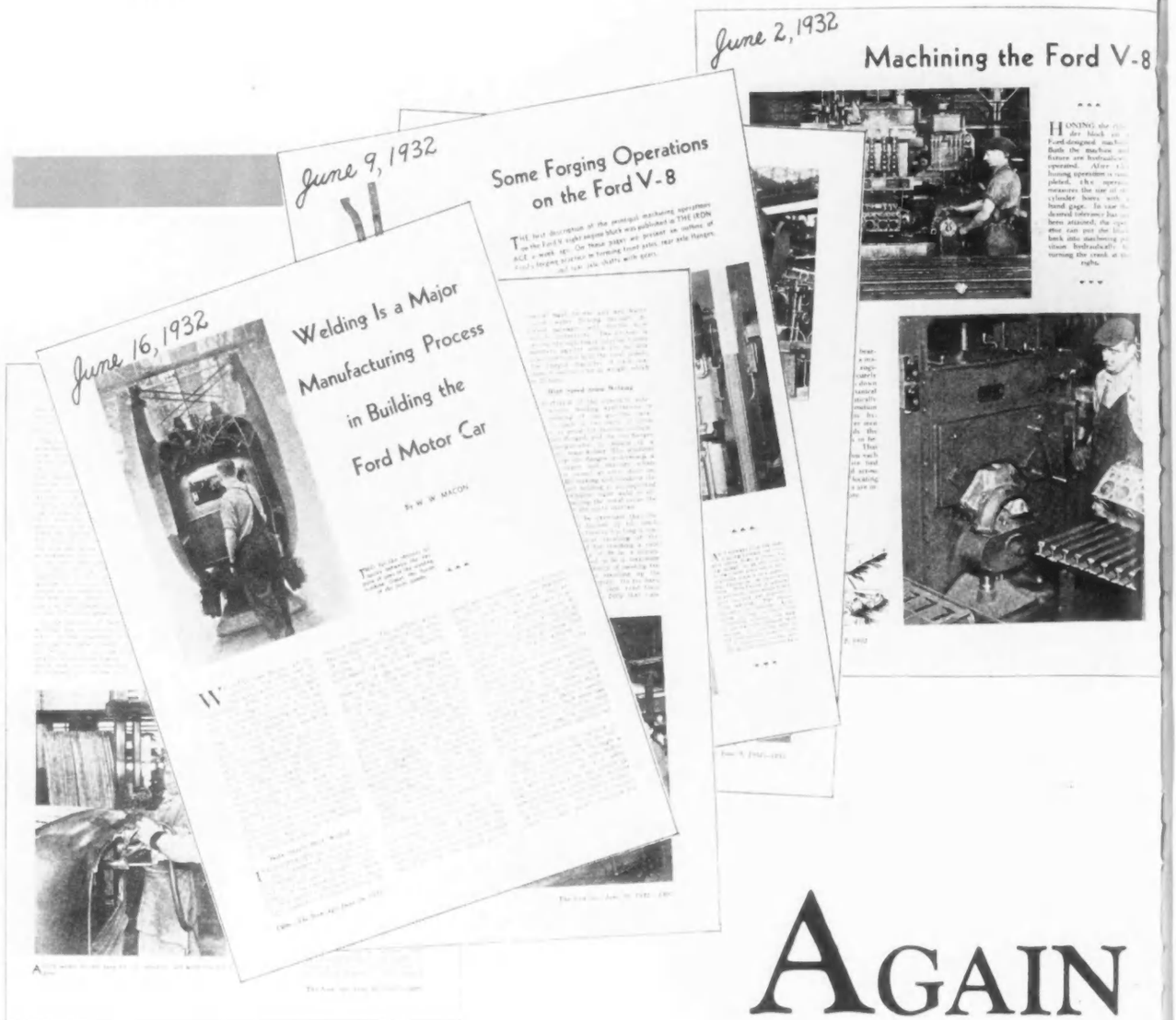

June 2, 1932
Machining the Ford V-8
June 9, 1932
Some Forging Operations on the Ford V-8
June 16, 1932
Welding Is a Major Manufacturing Process in Building the Ford Motor Car

AGAIN

In this Issue:—

"Valve Bushings and Motor Assembly of the Ford V-8"

Block
June 23, 1932
Operations on the Ford V-8 Crankshaft
June 30, 1932
Ford V-8 Crankshaft Department Equipped for Rapid, Accurate Operation

THE IRON AGE TAKES THE LEAD . . . . . .

This is the sixth article in The Iron Age series describing the manufacturing operations on the new Ford V-8. The series began June 2 and represents the first presentation of this subject in any publication.

CUT COSTS *with* REPUBLIC STRIP

Low cost cars are the result of careful planning. Low cost parts are often the result of using Republic strip steel.

Faster production, lower labor costs, lower waste material costs, higher percentage of acceptable parts—all are the result of using strip where other materials were formerly used. Thousands of automotive items are now being made from it—better and more economically, including frames, wheels, radiator casings, brake drums, axle housings, running boards, instrument panels, tire covers, hardware and trim.

Republic strip is uniform in structure and true to gauge and width.

It is made in a wide variety of materials and finishes. Our engineers, working with your engineers, will be glad to offer suggestions on how to cut costs with Republic strip, and at the same time improve quality.

REPUBLIC STEEL CORPORATION

GENERAL OFFICES YOUNGSTOWN, OHIO

Your Product Is Judged by Its Component Parts

A "Stronger-Than-Steel" Die-Cast Hose Coupling.

The reputation of your product rests on the satisfactory performance of its component parts. For each of those parts there is a correct metal and a correspondingly correct process of manufacture.

Many designers of metal parts have found that "Stronger-Than-Steel" Die Castings possess a fortunate combination of desirable qualities—qualities that meet present-day requirements in strength and wear, that lend themselves readily to difficult design problems, and that permit of economical manufacture.

ALUMINUM BRONZE STRONGER-THAN-STEEL DIE CASTINGS

are particularly suited for those parts which require one or more of the following qualities:

Dependable strength and rigidity—Average tensile strength of 85,000 lb. per sq. in. as cast.

Desirable hardness.

Uniformity in size and shape—reduces machine-shop costs.

Smooth, clean-looking finish—cuts finishing and polishing to a minimum.

Readily machinable when necessary.

High resistance to wear, abrasion, and shock.

Excellent resistance to corrosion.

Absence of aging changes.

If you would like to know whether any of the parts of your product can be manufactured economically as "Stronger-Than-Steel" Die Castings, our engineers will gladly give you definite information.

Our Bulletin No. 3 shows typical "Stronger-Than-Steel" Die Castings, which are now upholding the reputations of those products of which they are a part. It is yours for the asking.

Aurora Metal Company

Incorporated

616 West Park Ave. **Aurora, Illinois, U. S. A.**

SMOOTH - UNIFORM SHAFT

Contact

is essential in an OIL SEAL

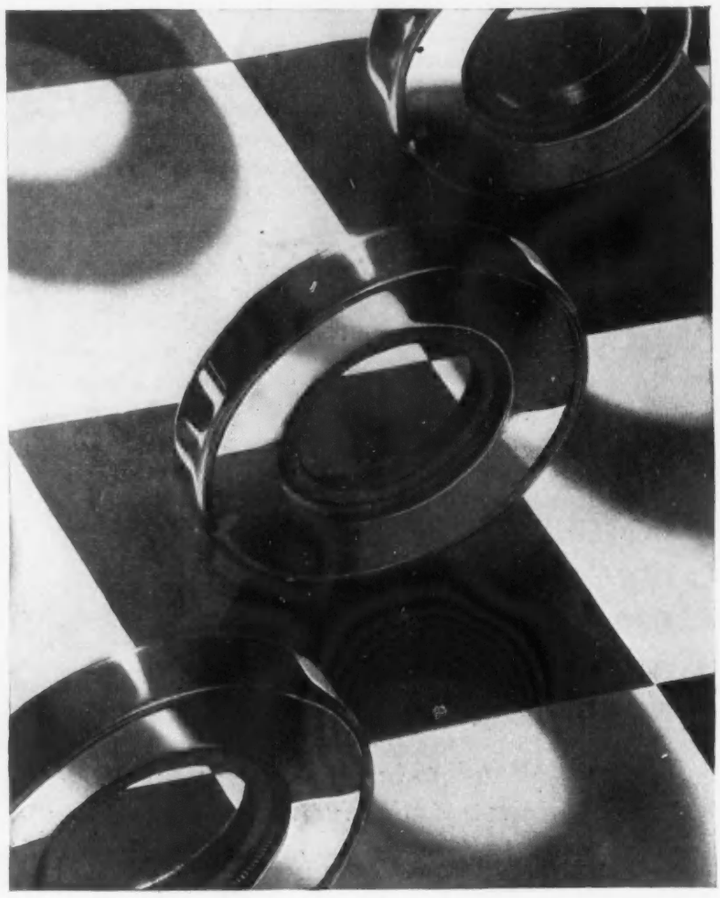
Perfect Oil Seal Leather Augmented by Scientifically Designed Spring Gives the Proper Contact.

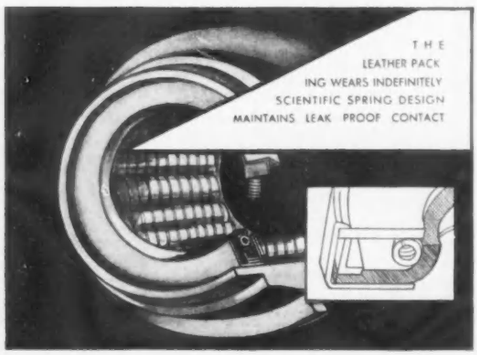
When oiled, this leather—a product of more than fifty years of experience in the processing of industrial leathers—becomes extremely soft and pliable. It efficiently retains all lubricants and successfully excludes all dust and abrasives.

The Perfect Oil Seal wears indefinitely. Recent tests of seals selected at random have continued through more than a hundred million revolutions with no signs of wear.

The design of the Perfect Oil Seal is not the product of guesswork. Hundreds of experiments preceded it. It is offered by the world's largest manufacturer of oil seals as the nearest to perfect it is possible to produce.

Perfect Oil Retainers are compact, self-contained units, ready for installation by a quick, simple press fitting operation. Send complete operating details with your inquiry.





Perfect
OIL RETAINERS

The CHICAGO RAWHIDE MANUFACTURING *Company*

1306 ELSTON AVE., CHICAGO, ILL.

NEW YORK DETROIT CLEVELAND PHILADELPHIA PITTSBURGH

"No need for this expensive finish..."

SUGGESTED SHARON SPECIFICATIONS

RESULT ▼ SUBSTANTIAL PRODUCTION SAVINGS FOR THE MANUFACTURER

It was an important, though unexposed part of a well known, nationally advertised commodity. Examination by one of Sharon's Metallurgists revealed that the manufacturer was using an expensive finish steel for the part, which was galvanized. ▼ After further metallurgical research, a less costly finished steel, but with added special physical characteristics to do the job better, was worked out. Many carloads of this "Sharon Specifications" improved steel have since been used successfully—and at a great saving to the manufacturer. ▼ Just one of many examples of the profitable use that can be made of "Sharon Specifications." Your product merits this experienced Engineering Service which assures the right use of the right steel for the product. ▼ Write for detailed explanation, stating your problem. It will be well worth your while.

SHARON STEEL HOOP CO.—SHARON, PA.

Strip Steels
Hot and Cold Rolled

—

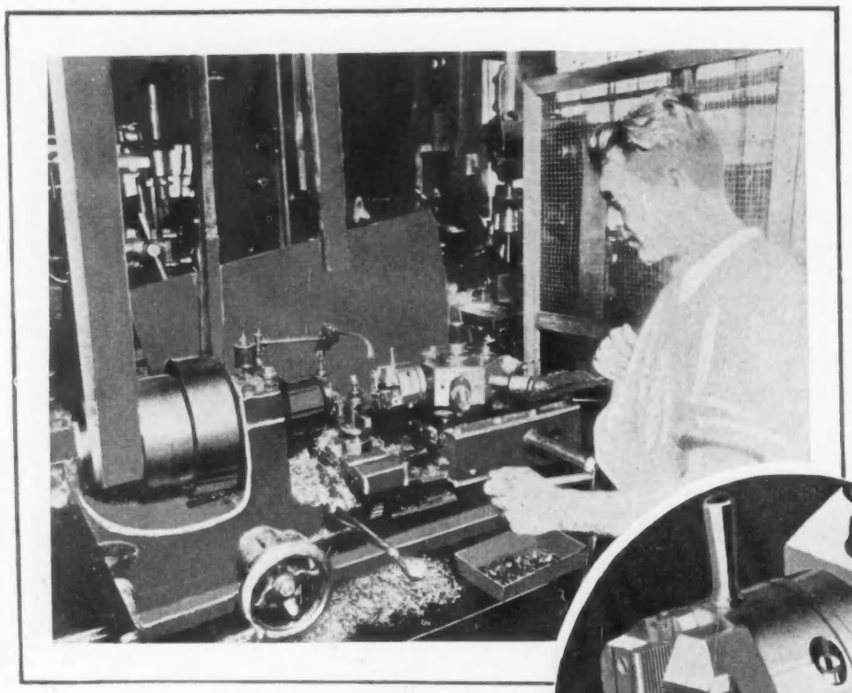
"Nevastain"
Stainless Steels

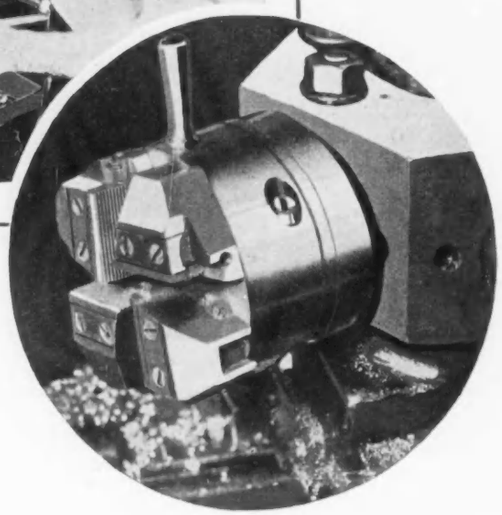
—

Enamelite
Enameling Iron

—

Steel Sheets





THREAD MODERN ALLOY STEELS WITH LANDMATIC HEADS

Manufacturers using the various stainless and wear-resisting steels can effect a very decided saving in their threading costs by using LANDMATIC Heads.

LANDMATIC Heads employ the patented Landis Chaser which is ground—in the same manner as a lathe tool — to suit the machinability of the material to be threaded. This feature insures a high finish to the thread and reduces the percentage of rejections ordinarily encountered when threading the modern alloy steels.

Then too, because the Landis Chaser has "line contact" with the work, wear at the cutting edge is lessened and more threads are produced between grinds. This fact, together with the unusually long life of the Landis Chaser which permits of many regrindings, lowers tool cost to the minimum.

May we send you our latest bulletin on LANDMATIC Heads? No obligation attached—write today.

The LANDIS Chaser has a "free cutting" action because of its line contact and variable rake angle.

LANDIS MACHINE COMPANY, INC., WAYNESBORO, PENNSYLVANIA

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THE IRON AGE .. July 7, 1932

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ADVERTISING STAFF
Emerson Findley, 1362 Hanna Bldg., Cleveland.
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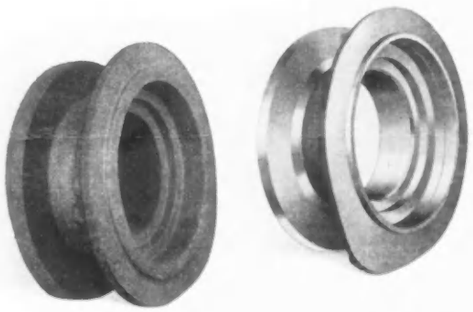

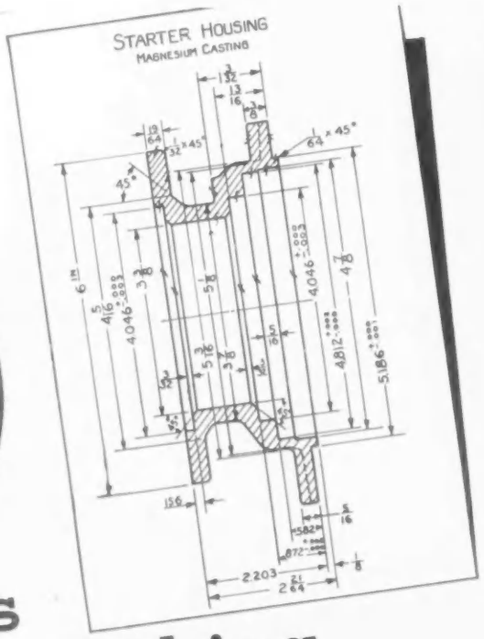

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..THE IRON AGE..

NEW YORK, JULY 7, 1932

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Russia—An Attractive Market for American Products

R. A. SOLBORG, Vice-President, the Armco International Corpn., the author of this article, is an American citizen who was born in Warsaw, Poland. He was educated in Russia, and took his degree in the University of Leipzig, Germany, and the Sorbonne of Paris.

For more than 16 years he has been a member of the Armco International Corpn., foreign subsidiary of the American Rolling Mill Co. His headquarters are located in Paris. He opened Armco's first continental office and has built up a number of effective and successful manufacturing and sales agencies in the important centers of Europe.

Mr. Solborg has just returned from an extended visit in Russia, during which he concluded contracts for Armco-French, -German and -British associated companies. His views on the Russian credit problem which confronts American manufacturers today are fresh and interesting, as he has given considerable thought to how the deadlock in Russian credit may be broken.

A DARK cloud of mystery obscures Soviet Russia from the view of American industry. This fog has arisen because of the difficulty in securing unbiased commercial reports and the lack of proper machinery for obtaining and disseminating accurate information through our regular Government channels. The fragmentary bits of largely superficial information which do drift into America are secured mainly by short observation tours and consequently are tinted with the personal prejudice, either pro or con, of the observer.

The biggest obstacle to international trade is credit. It is not so difficult within the boundaries of any country where daily contacts reveal the character or the integrity of an individual or a company to establish a workable credit system. But when it comes to commerce between nations, the problem is more complex. However, the same basis for confidence must underlie the international credit structure.

The Soviet Government has realized the necessity for maintaining this confidence, and has handled its financial problems with commendable foresight, by carefully budgeting its expenditures and meeting its obligations.

There has been considerable speculation and fear in this country as to Russia's ability to pay. This is, I believe, due largely to that haze of doubt caused by the absence of authentic trade information. The ability to pay one's obligations is the ultimate test of credit. No matter how righteous the character, or how sterling the integrity of a nation, it must possess sufficient ability and ingenuity in meeting its daily problems to carry on its own affairs successfully and productively. The ability to pay is largely reflective of the ability to do. The Soviet Government has never failed to pay its foreign obligations, and to pay in gold.

As nations go, the Soviet Republic is still young. It cannot be denied that the task of industrializing a nation which, under an autocratic form of government had never provided for industrial independence, is a gigantic one. It is only natural that, among a people untrained in scientific industrial management, mistakes would in-

(*Concluded on page* 45)

Chromium Plating Applied to Steel Mill Rolls

By N. H. McKAY
Metallurgist, United States Chromium Corpn., Pittsburgh

ALTHOUGH chromium plating was introduced primarily for appearance and decorative purposes, engineers have discovered that it has other advantages, such as resistance to wear and resistance to corrosion.

In industry we find the use of chromium plate for rock drills and pneumatic tools in limestone quarries, for pump parts and compressor parts at the coal mine. Again we find chromium on the ore-handling equipment on docks and on crane machinery where pins and rollers and bearings, journals, cams and axles must be protected against wear and against corrosion. Chromium plating is used also in blast furnace plants on charging equipment and on tuyeres.

Chromium plating permits the obtainment of extremely hard surfaces. Its hardness cannot accurately be measured by the ordinary testing methods such as with the Brinell or the Shore instruments, for even this wear-resisting surface can be applied to very soft steel. A true measure of the wear-resisting qualities of chromium plate can be secured only in actual service.

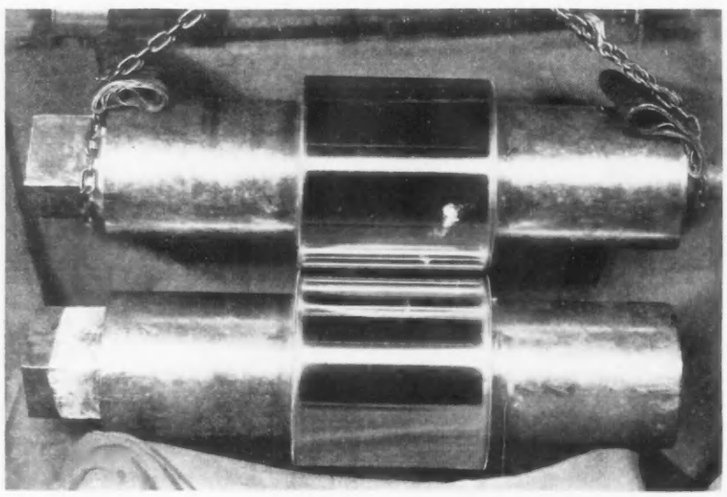
On true abrasion applications, such as we have in the ceramic industry, or in the pressing or extruding of silicious materials, chromium plating has outlasted materials with Brinell as high as 1300. This resistance to abrasion is also seen in the steel industry on such applications as draw dies and mandrels for the fabrication of seamless tubing.

Steel Mill Rolls Now Being Plated

Some of the most interesting applications of chromium are found in the plating of steel mill rolls. Among these should be mentioned particularly roller leveler rolls and cold finishing rolls. Other rolls which have been successfully plated are cold sheet mill rolls, tin pot rolls and tube forming rolls. In the case of roller leveler rolls, it has been possible to substitute ordinary forged steel (0.70 to 0.80 per cent carbon) for tool steel. It is also possible, having a well ground finish on the roll before chromium plating, to provide the chromium-plated surface with a much higher finish than can be offered with a tool steel roll.

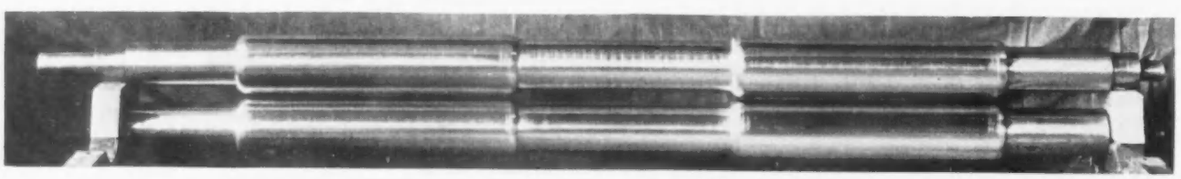
Because of the extreme hardness of chromium, these plated leveler rolls remain in service over a long period of time, outlasting a tool steel roll from four to six regrinding periods. When the plated leveler rolls finally indicate some wearing through of the chromium plate, provided the underlying steel has not been marred, the plating can be stripped and the roll can be again chromium plated without regrinding. The cost of chromium plating on this application is relatively inexpensive, considering the initial cost of the rolls.

Chromium plate presents another advantage in connection with cold-

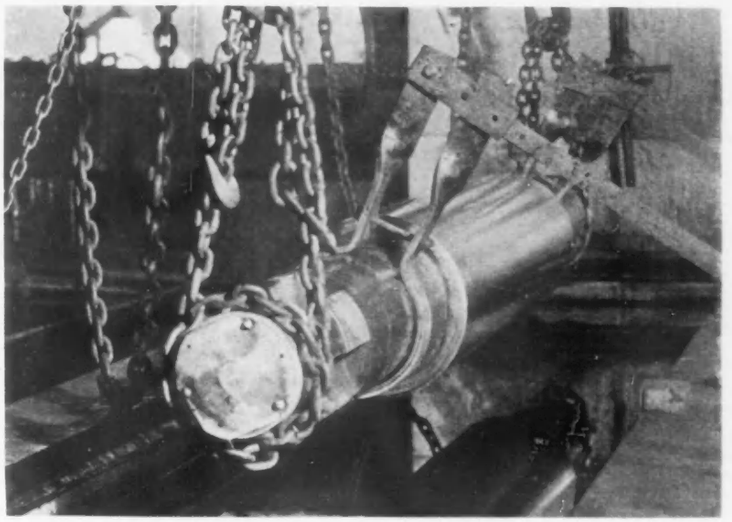


(Above) Cold strip finishing rolls, plated with chromium to produce mirror strip.

(Below) Tin pot rolls, chromium plated to prevent the corrosion of the steel by the hot tin and drosses.



UTILITARIAN applications of chromium plating are becoming as common as decorative uses. The plating of steel mill rolls with chromium is one of the latest developments and one of great promise, according to the author. Plated rolls with a high mirror finish are now being used in strip mills. Chromium is also being applied to leveler rolls, cold sheet rolls, tin pot rolls and tube-forming rolls. An interesting use of chromium plating is in reclaiming roll necks that have been accidentally machined undersize.



A sheet mill roll coming out of the chromum plating equipment. Note the crane and tank facilities for handling large equipment.

finishing rolls for strip mills. On this application, the finish of the strip depends largely upon the maintenance of a high finish on the working surface of the roll. By chromium-plating cold-finishing rolls it is possible to produce a high mirror finish on the rolls, which, in turn, is imparted to the strip. The author has seen chromium-plated cold-finishing rolls which presented such a high luster that, when standing at a distance of some 30 to 40 ft. from the stand, the rolls looked like one continuous mirror, and it was impossible to see where the two rolls came together.

Chromium here again will introduce a saving, although some operators have an opinion at variance with this. It should be explained that when plating rolls on an experimental basis, the cost has been somewhat high; yet, in every case where the plating of these rolls has moved from experiment to a matter of routine, the cost saving has been passed on to the steel mill.

Moreover, chromium-plated surfaces do not have the tendency to pick up foreign matter, dirt or scale which would tend to gouge or mar material which is processed after the pick-up. This is evident in the case of chromium-plated draw dies and mandrels for the fabrication of tubing.

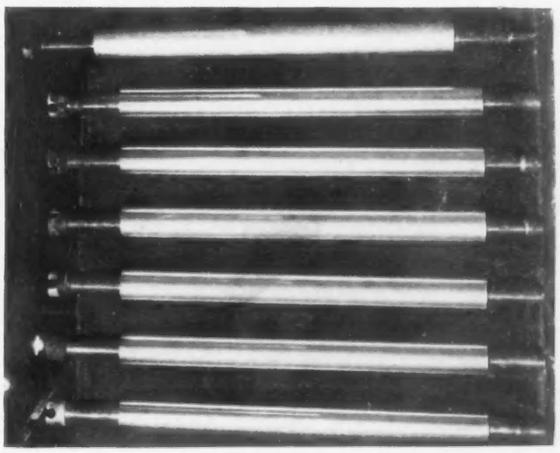
Reclaiming Material by Plating

Meeting requirements in the plating of rolls for the manufacture of gold and silver leaf, and also high-quality copper and aluminum foil, furnished experience for the plating of high-finish rolls, such as those of the Steckel mill.

Chromium plating as a means of reclamation has saved much material in the steel industry in the last three or four years. Frequently plating has been applied to the neck or journal of a large mill roll which has been accidentally machined undersize, and which would have been impossible to reclaim by welding, as this would have spoiled the heat treatment of the roll. The chromium plating is applied at room temperature and does not affect the base metal.

Chromium Plating of Roll Neck

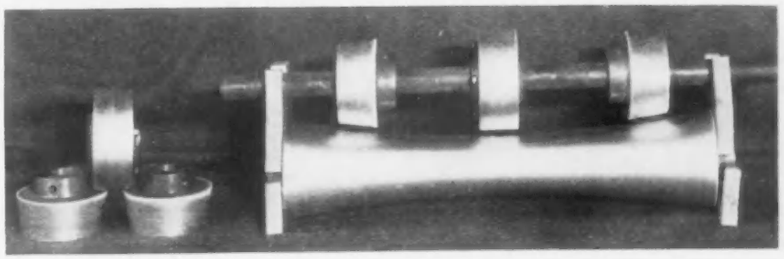
To those who have had some experience with chromium plating it should be interesting to note that in one case of reclamation a portion of a roll neck was plated with 0.165 in. of chromium as measured on the diameter. This is believed to be the heaviest deposit of chromium ever made. Generally, the economic limit is reached before the technical limit. Much of the reclamation work, such as the building up of bearings or the filling of inside diameters, has been on the order of 0.020 in., which is considerably heavier than most practice in chromium plating.



ROLLER leveller rolls. The chromium plating holds the high finish.

❖ ❖ ❖

CURVED cast iron rolls plated with chromium.

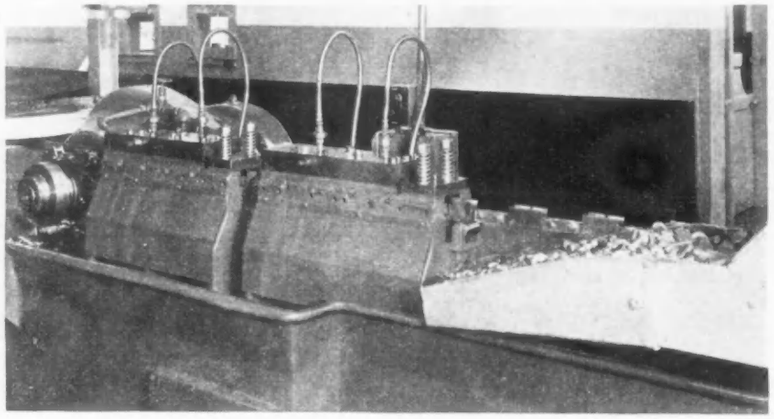


Valve Bushings and Motor Assembly of the Ford V-8

Sixth in a Series of Articles Describing the Manufacture of the Ford V-8

By BURNHAM FINNEY
Detroit Editor, The Iron Age

MANY small as well as large parts going into the Ford V-eight car are made at the Rouge plant of the Ford Motor Co. One of these parts is the valve bushing which is cast in halves in the Ford foundry and transported in metal baskets on a monorail overhead conveyor from the foundry building to the motor building where it is machined and the two halves assembled into a single piece.



Bushings (above) are rough and finish broached at the rate of 17,000 per 8 hr. on a special continuous chain-type machine with 55 loading stations.

The face of valve split bushings is lapped by hand on special machines consisting of a cast iron work table, a wheel composed of a combination of diamond and emery dust and a motor mounted under the table.

Valve split bushings are delivered from the foundry to an overhead platform where an operator detaches a loaded basket and dumps its contents down a metal chute to the loading station of a Ford-designed machine for cutting the bushings to length. This machine may be likened to a traveling broaching machine and possesses 21 fixtures for holding the work. Each fixture is mounted on a chain which travels past the cutters, discharges the bushings at the end of the machine and returns empty to the loading place at the other end, the entire trip being made in 30 sec.

Bushings are put in the fixtures crosswise. As they move into the cutting area, where a special head containing the broaches is located, they come in contact with a spring on one side which automatically locks a wedge in the fixture, holding the work tight. When bushings reach the end of the cutting area, they are released by a similar spring arrangement. On each side of the machine's head are three broaches, the top serving merely to hold down the work during cutting. The head can easily be taken apart so that the broaches can be removed. Kerosene and oil are used as the lubricant, since kerosene alone would have a tendency to make the chips stick to the fixtures and pass through the broaches. This machine, like all equipment at the Rouge plant, is individually motor-driven.

After bushings are cut to length, they are broached on a Ford-designed broaching machine, a battery of six handling 17,000 pieces each per 8 hr. This machine has 55 fixtures or loading stations, is of the continuous chain type and has two heads. No clamping of the work is necessary, as the fixtures are so deep that the bushings fit into them snugly. The broaches, located in the head, are upside down, the first set performing a roughing operation and the second set a finishing operation. In the former process 0.020 in. of material is removed and in the latter 0.010 in. As in the case of the previously described machine, the work is discharged at the end into metal baskets, the fixtures returning empty to the loading

position. One complete trip of the fixture takes 1 min. 55 sec.

From the broaching machines the bushings are carried on an overhead monorail conveyor through a washing machine where they are cleaned with a caustic soda solution and thence go to special lapping machines of Ford design. These machines consist of a cast iron work table, a wheel composed of a combination of diamond and emery dust and a motor mounted under the table. Incidentally, the diamond dust from the operations where diamond-tipped tools are used is retrieved and employed in the manufacture of the lapping wheels.

Three operators can work at one lapping machine. Each man has his own small bench adjoining the lapping wheel and attached to it is a gage and a brush. The operator gages the bushing, laps it by hand, wipes it off on the brush, and gages it again to be sure it is correct. There are two vertical metal guards on the machine to protect the men in case one of them should accidentally let a bushing get out of his hand during the lapping process. The base of the lapping wheel is fixed securely in the center of the cast iron table, the wheel revolving at the rate of 700 r.p.m. The wheel is redressed with a diamond twice every 8 hr. For this work the diamond is controlled by a crank on the sliding head of the machine. Each operator laps an average of 480 pieces per hr., removing 0.001 in. to 0.0015 in. of material.

After lapping, split bushings are put together in trays to protect their faces by the lapping operators, going through the same washing machine as they did prior to being lapped. They then are loaded on arbors. Following operations include grinding the shoulder and outside diameter on a special machine equipped with hydraulic gage mountings, turning the outside diameter of the collar and chamfering the end on a shaving machine and, after the two pieces are united, reaming the center hole.

At the point in the motor building where the cylinder block comes in from the foundry, the overhead chain conveyor dips so that blocks can ride along on a roller conveyor and be easily unhooked by machine operators. Above the roller conveyor the overhead chain conveyor is enclosed in a metal guard protecting the conveyor itself and preventing injury to workmen in case they should be careless. The motor conveyor is operated by a 7-hp. motor at 1150 r.p.m. and is equipped with a speed reducer.

Valve seats are cut in the cylinder block on a valve seating machine with a Ford-designed, air-operated cradle for holding the work. The block is moved to the machine from a roller conveyor by air hoist. The machine has an eight-spindle head which cuts the valve seats on one bank of the block. By turning a lever, the oper-

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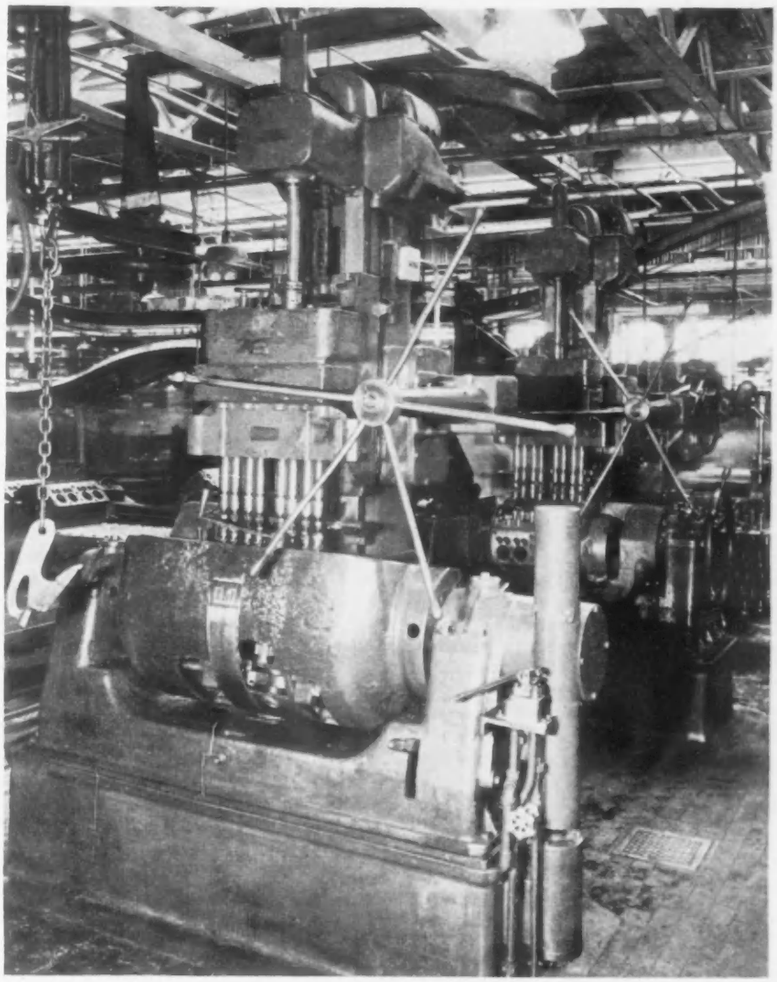
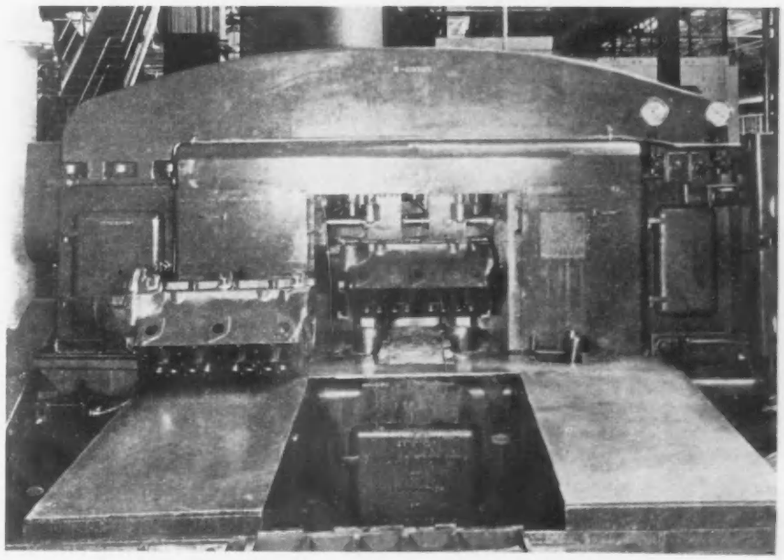


Valve seats are cut on a valve seating machine with a special air-operated cradle to hold the block. By turning a lever the operator sets the cradle in motion, turning the block into proper position for the work.

Main bearings are automatically rough and finish bored on a special hydraulic boring lathe with a fixture which lifts the cylinder block by hydraulic pressure up to the cutting bar.



Design and Care of Dies in a Job Forging Shop

By HERBERT R. SIMONDS

IN any forge shop the construction and care of dies is a highly important factor, and this is particularly true in the case of a jobbing forge shop. A typical example of such a jobbing shop is to be found at the plant of the Billings & Spencer Co., Hartford, Conn., for this company's forge department, although operating partly on standard products of the company, nevertheless finds its chief activity in the jobbing trade and even in the case of the company's own production it operates as an independent unit, billing the other departments as if they were outside customers.

Indicative of the importance of dies in forging is the size of the die shop. At the Billings & Spencer plant the space devoted to dies, including storage, tool room, machine shop and heat treating department, is about as large as the forge shop proper. Most all of the work in the various branches of the shop is on a piece-work basis. This extends even to the making of the dies and the heat treating of the die blocks.

When a new order for forgings is received at the plant, it is checked over by the engineering department, and if approved as to design and economical arrangement it is sent with such suggestions as the engineering department may make to the estimating department. The estimator through long experience and reference to previous similar work is able to place an accurate cost figure on the dies. This cost includes direct labor, material, machine tool charge and overhead. The direct labor item is the exact amount paid to the die-maker for the job of making this particular set of dies.

If the die-maker for any reason feels that the price is too low, the matter is referred back to the estimating department for refiguring. In most cases the die-makers, who are employees of years of experience with the company, are able to estimate the time required to make a new set of dies with surprising accuracy, and their opinion, therefore, serves as a check on the estimating department.

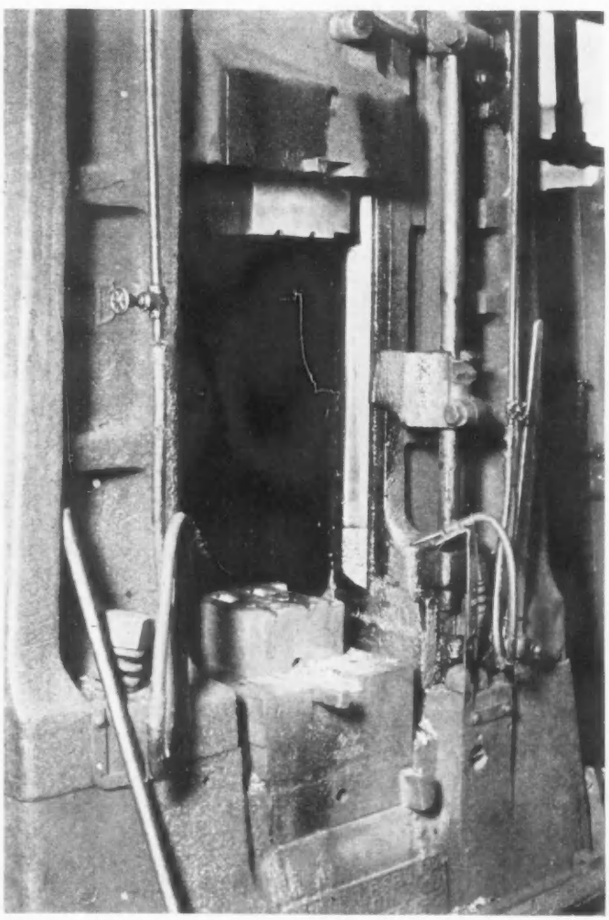


Fig. 2.—Rugged equipment is used for accurate work.

Redesigning for Lower Cost

In case the engineering department, viewing the new order from the angle of the forging manufacturer, does not approve the design of the forging submitted with the order, it makes modifications and suggestions for changes and refers these back to the company which sent in the order. After some correspondence or perhaps a personal interview, the buyer usually finds it possible to change the forging design without altering its efficiency in his own assembled product and at the same time effect a saving to him in the cost of the forging or of the dies.

The suggestions of the engineering department in this regard may contain clauses something as follows: "If it is possible for you to shorten up the hub on your engine part No. 207, we can use a smaller die block at a saving to you of 14c. a forging on the first 500." "By joining your two forgings No. 86 and No. 88 at the flange sections, we can cut down the total cost of forgings on your recent order by about 35 per cent. This would mean that the two pieces would have to be sawed apart through the flange. This cut could be handled in your own plant or we could do it in our machine shop at a cost of 8c. a piece, which still leaves a substantial saving to you."

Seventy-five per cent of the cost of

AS with patterns in a foundry so with dies in a jobbing forge shop. They constitute both stock in trade and opportunity for trouble. In this article the author describes some of the die making problems and economies at the plant of the Billings & Spencer Co. Of interest to all users of forgings is the experience this company has had in redesigning its customers' products to effect a reduction in the cost of both dies and forgings.

Fig. 1.—Success in a job forging plant is dependent upon the careful, painstaking work of the experienced die-maker.

each set of dies is charged to the customer, leaving a 25 per cent equity held by the forge shop. In case the customer wants to take possession of the dies, he is privileged to do so by paying the extra 25 per cent. If, as is usually the case, the dies are left in the storage department of the forge shop, they are carried storage-free for seven years, after which time a small storage charge is added.

All dies which remain in storage for a period of seven years without any orders having been entered against them become the property of the forge shop. As the end of such a seven-year period approaches, the customer is notified and is given an opportunity to buy out the forge shop equity and take possession of his dies. Of course, these rules are subject to some modification, and it is only good business to be lenient with old customers who some day may again become active buyers of forgings.

Many interesting tales are told by the shop superintendent. One large expensive set of dies had passed the seven-year period without an order, but the superintendent had a hunch about them, and instead of destroying them or salvaging parts, as is customary, he removed these particular dies from their customary place and put them in an out-of-the-way corner. Thus he avoided having them as a constant reminder that the period of inactivity had lapsed. For three years these dies remained untouched in their new corner, and then one day without any preliminaries or comment from the customer, a large order of forgings from this particular set of dies was received. The forge shop on its part made no comment either, but made up the order and shipped the forgings as if the dies had been in use just the previous month instead of the previous decade.

Some of the incidents reported by the superintendent are not as cheering as this, for it seems to happen with singular regularity that a customer, after allowing long unused dies to be destroyed and, in fact, after saying that he will never want to use them again, suddenly places an order and is considerably disturbed when informed that new dies and a new die charge will be necessary.

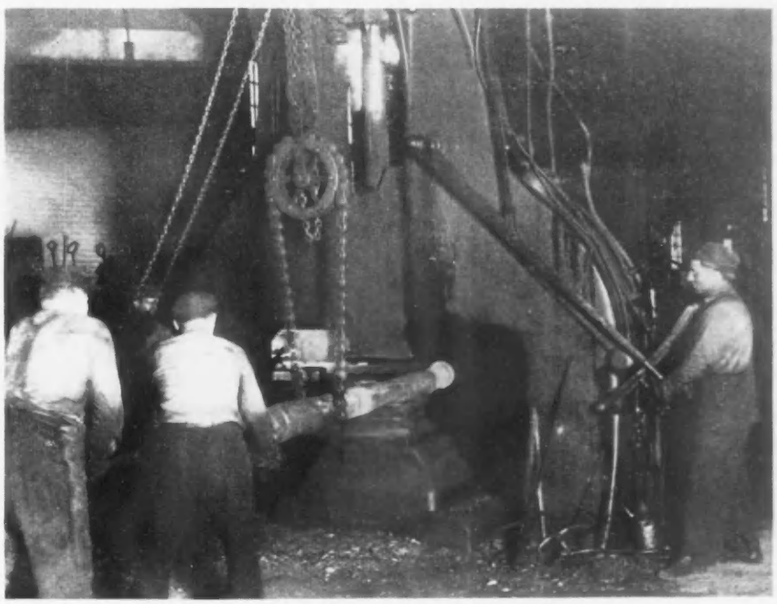


Fig. 3—The jobbing forge shop prepared to handle all kinds of work must have at least one massive heavy-duty hammer.

Die Design Important

Most forgings have four die operations. The first known as the edger gives the hot bar an initial blow which bends it, squeezes it or otherwise gives it a form roughly similar to that of the next operation, which is called the blocking impression. This second operation brings the forging to a rough approximation of the finished product. The third operation, known as the finishing impression, completes the form of the forging (it still must be trimmed), and the fourth operation, known as the cut-off, cuts the forging from the bar.

In designing a set of dies many details are of course important, as the life of the die often depends on seemingly insignificant features. The metal of the forging is cooler when it reaches the finishing impression

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. . . New Alloy Cements for H

IN the preparation of the carbide metal alloys now widely used for cutting tools, it is customary to cement together the hard, refractory carbide particles with a metal such as cobalt, much softer than the carbide, in order to reduce the brittleness of the final alloy. By employing a larger proportion of this auxiliary or cementing metal, the brittleness is still further reduced, but at the same time, unfortunately, the mean hardness of the product is reduced.

Accordingly, it seemed of interest to investigate the possibilities of finding a material which would not merely serve as a cement, but which in itself would be hard and tough, with the hopes of producing a final product decidedly tougher than any of the carbide alloy products on the market today. The use of an alloy as a cement, for example an alloy such as stellite (cobalt-chrome-tungsten) or nickel-tantalum, permits of a wide variation of the properties of the final product. We can, for example, vary the proportion of cement used, or the proportions of the metals composing the alloy cement, or the percentage of carbon in the alloy cement, etc. Since the refractory carbide alloys are made by the metal-powder method, widely different compositions can be easily prepared and readily reproduced.

In the present communication we shall confine ourselves to the results obtained with the application of a cobalt-tungsten alloy as the cementing material.

There are several steps in the procedure of preparing tungsten-carbide cemented with tungsten-cobalt alloy. The quality of the product is very much dependent upon the details of each step.

(a) Preparation of Dense WO_3

Technically pure tungstic acid (Eimer & Amend) was dissolved in dilute ammonia. The solution was carefully neutralized with dilute hydrochloric acid, and fine crystals of ammonium-para-tungstate collected on a filter, dried and fired in a quartz crucible at temperatures ranging between 900 and 1450 deg. C. By proper selection of the firing temperature, firing time and ball-milling of the product, the apparent density of the oxide, WO_3, could be varied at will. When fired at 900 deg. C. the apparent density was 2.4 to 3.0; when fired at 1200 to 1450 deg. C. it was 4.7 to 5.0. Uniformly heavy (5.0) oxide was obtained by firing at 1275 deg. C. for 1 hr. and then ball-milling.

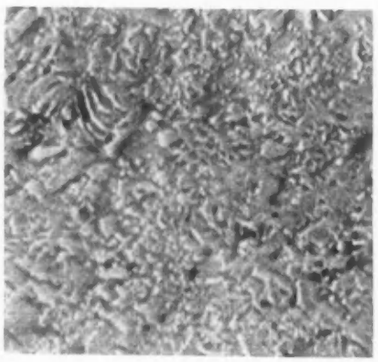


Fig. 1.—Structure of Carboloy at 2000 diameters, unetched. It has been polished by a method developed by the authors.

(b) Preparation of Dense Tungsten Metal Powder

The fired WO_3 was reduced by hydrogen (200 liters per hr.) by filling same into a nickel boat which was placed into a 1½-in. (3.8 cm.) iron tube heated to 1100-1250 deg. C. By selecting oxides of definite apparent density, regulating the depth of charge of oxide in the nickel boat, temperature of reduction, speed and dryness of hydrogen, tungsten metal powders were produced ranging in apparent density from 7.0 to 10.0 (grams powder per cubic centimeter).

The grain size increases with the temperature of reduction. Thus, for example, starting out with the same oxide (apparent density 3.9), the maximum grain size was 0.008 mm. for a reduction temperature of 1100 deg. C. and 0.018 mm. for 1250 deg. C. By properly blending heavier and lighter samples of tungsten metal powder, a mixture was obtained having an apparent density of 11.1. These heavier powders were usually preferred in making up the final carbide alloy.

(c) Preparation of the Cobalt-Tungsten Alloy Powder

Two aqueous solutions were used: (1) a concentrated solution of cobalt nitrate, and (2) a concentrated solution of ammonium tungstate. Predetermined amounts of the heated cobalt solution were added to the tungsten solution, and the combined solutions together with the precipitate of cobalt tungstate slowly evaporated to dryness, stirring constantly. The dry salt cake was ignited and then reduced in the hydrogen furnace at 800 deg. C. A powdered metallic product was obtained containing the cobalt in a uniformly distributed manner. The procedure for the cobalt-molybdenum alloys is the same as for tungsten, substituting a concentrated ammonium molybdate solution for the ammonium tungstate solution.

In this way one of the alloy powders prepared (P No. 1) contained 5.3 per cent cobalt and 94.6 per cent tungsten.

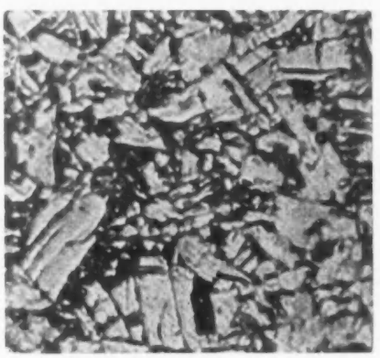


Fig. 2.—Structure of the new alloy, 16A, of the table at 2000 diameters, etched. Two constituents are visible, carbide and the matrix.

(d) Preparation of the Carbides and Carbide Alloys

The tungsten carbide (WC) was prepared by adding 184 parts of the tungsten metal powder to 12 parts of lamp black and mixing in a chilled-iron ball mill for 4 to 5 hr. Then the mixture was sintered in a graphite tube, hydrogen atmosphere, at 1500 deg. C. for 2 hr. In one of these experiments the tungsten powder had an apparent density of 11.1 gm. per cc. The WC obtained (P No. 3) was very hard and brittle and was used as a basis for the finished alloys recorded below.

Similarly, alloy powder P No. 1, containing 5.3 per cent Co, was mixed with lamp black in the proportion of 94.2 parts of alloy to 5.8 parts of carbon. This mixture was placed into a graphite tube and sintered in a hydrogen furnace at 1390 deg. for 4 hr. The sintered mass obtained was extremely hard and tough, and it was very difficult to reduce it to powder. It was eventually broken up and

Hard Metal Carbides

By DR. COLIN G. FINK
and G. A. MEYERSON

Head, division of electrochemistry, and graduate student respectively, Columbia University, New York.

THE authors conducted an investigation to find a way of reducing the brittleness, without sacrifice in hardness, of the cobalt-tungsten carbide and similar alloys now so widely used for the bearings of drawing dies and as cutting edges for lathe and other tools.

The experiments, reported on in this article, indicate that the proper selection of the binding or cementing material for the carbide is of prime importance and that the substitution of a hard, tough alloy, such as cobalt-tungsten, cobalt-carbon-tungsten, or cobalt-molybdenum, in place of cobalt alone, results in a carbide alloy which is not only a tougher but even a harder product.

It was found that an alloy composed of 94.75 per cent of tungsten carbide (WC) and 5.25 per cent of cobalt in which the cementing material was an alloy of cobalt, tungsten and carbon, results in a finished alloy which is very tough and of a hardness equal to 87.3 Rockwell. Details of preparing the new alloys are given.

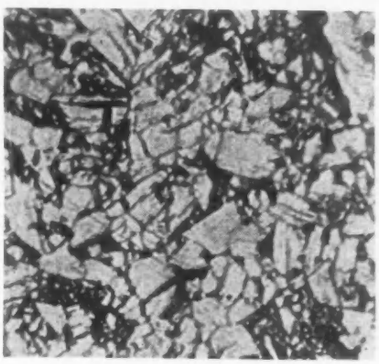


Fig. 3.—Structure of the new alloy, 17A, of the table at 2000 diameters, etched. There is a third constituent present in this alloy and absent in Fig. 2, grayish in color. Both alloys (Figs. 2 and 3) appear very compact with only a small number of cavities.

reduced to a powder of apparent density 8.3 gm. per cc. and a maximum grain size of 0.004. This product (P No. 5) had the following approximate composition: W 89.2, C 5.8 and Co 5.0 per cent.

Metal powder product, P No. 6, was made up as follows: Hot, concentrated cobalt nitrate solution was added to concentrated ammonium tungstate solution sufficient to produce upon evaporation and reduction an alloy powder containing 3.2 per cent Co and 96.8 per cent W. Then 80 parts of this alloy powder were mixed in the ball mill for 3½ hr. with 5 parts of carbon (lamp black). The mixture was heated in a carbon tube in a hydrogen furnace for 1½ hr. at 1450 deg. C. The sintered mass crushed rather easily and was milled for only ½ hr.

Alloy No. 16 *A.*—This was made up as follows: 10 parts of P No. 5 were added to 10 parts of fine cobalt metal powder and ball-milled for 4½ hr. To this mixture was then added 180 parts of the tungsten carbide, and the whole ball-milled for another 15 hr. The final powder had the following approximate composition: WC 94.75 per cent, Co 5.25 per cent. This powder was filled into a mold (made of high-speed tungsten steel) and compressed at 25 tons per sq. in. (40 kg. per sq. mm.) and sintered in hydrogen at 900 deg. C. for ½ hr. and then at 900 to 1440 deg. for 1 hr.; and finally at 1440 to 1470 deg. C. for 1.5 hr. The finished rod was very tough, and its Rockwell hardness was found to be 86.6 (Scale "A"; load, 60 kg.).

Fig. 4.—Typical etched structure of the group represented by alloy 19B of the table. This is similar to that of Figs. 2 and 3, and also has three constituents as in Fig. 3. This alloy is also very dense and tough.

Alloy No. 16 *B.*—This was the same in composition and preparation as Alloy No. 16 A, except that the sintering in hydrogen of the compressed rod was as follows:

At 900 deg. C for ½ hr.
Then at 1000 deg. C. to 1500 deg. C. for 2 hr.
Then at 1500 deg. C. for 1½ hr.
Product: Very tough: hardness, 86.8 and 87.3 *.

Alloy No. 17 *A.*—This was made by mixing together in the ball mill for 17 hr.

4 parts by weight Co metal powder
2¼ parts by weight P No. 5 metal powder
¾ parts by weight Mo metal powder
90 parts by weight P No. 3 metal powder

The final composition was:

	Per Cent
WC	94.28
Co	4.22
Mo	1.5

The mixture was pressed into a rod at 40 kg. per sq. mm. and sintered in hydrogen at 900 deg. C., ½ hr.; 1000 to 1450 deg., 1 hr.; 1450 deg., 1½ hr. Very tough: hardness, 87.0.

Alloy No. 17 *B.*—This was of the same composition and preparation as Alloy No. 17 A except that the sintering schedule was as follows:

900 deg. C. ½ hr.
1000 to 1500 deg. C. 2 hr.
1500 deg. C. 1½ hr.
Very tough: hardness 86.8

Alloy No. 19 *A.*—In this alloy an alloy of cobalt and molybdenum (66.66 per cent Co) served as cementing material. We used 83.7 parts of P No. 6 powder and 1.8 parts of Co-Mo alloy powder, and ball-milled the mixture for 20 hr. The composition of the mixture was as follows:

	Per Cent
WC	95.0
Co	4.3
Mo	0.7

Rods were pressed from this mixture at 40 kg. per sq. mm. and then sintered in hydrogen: ½ hr. at 900 deg. C.; 1 hr. at 1000 to 1460 deg.; 1½ hr. at 1460-1500 deg. C. The alloy was tough and Rockwelled 87.15.

Alloy No. 19 *B.*—To further increase the toughness, we decided to try the addition of a small percentage of a non-ferrous metal—with little or no affinity for carbon. To part of the ball-milled powder mixture of No. 19 A we added 0.5 per cent of fine copper powder, then pressed in the

* A standard sample of tungsten carbide cemented by cobalt metal tested at the same time on the same Rockwell machine gave us a value of 86.0.

(*Concluded on page* 47)

A Comparative Cost System for th

IN two previous instalments the author outlined the general principles underlying his comparative cost system and the methods employed in ascertaining the different factors making up the "ideal" cost of blast furnace operations. In the current and concluding instalment he explains how adjustments are made for metallurgical variations in the raw materials. As he puts it, "the superintendent is responsible for what he does with the materials furnished by the management but not for the quality and the prices."

AFTER determining the working volume of a blast furnace by calculation and after agreement as to the operating organization, and their wages and salaries, and as to the daily budget for supplies and service, and overhead, and as to the per ton charge for relining and depreciation, then there must be made each month certain adjustments so as to conform to the metallurgical variations in the raw materials.

The daily sums of money budgeted for labor, salaries, supplies, service and overhead are fixed by conference and agreement, and are not changed except on authority of the executive in charge of operations. The charges per ton of pig iron for relining and depreciation are also fixed by agreement and are not changed except on the same authority.

Coke Adjustment

Pig iron is not produced unless fuel is burned, and the rate of production depends upon the rate of combustion of the fuel. In blast furnaces using coke as fuel, the ideal rate of combustion is 60 lb. of coke per 24 hr. for each cubic foot of working volume. As previously explained, the base coke for the comparative cost system contains 90 per cent fixed carbon (dried at 212 deg. F.) and 3 per cent moisture. It is acknowledged that 1800 lb. of such coke will be used in making a ton of pig iron (2240 lb.) from 1.825 tons of an ore mixture containing 51.50 per cent Fe (natural), using 850 lb. of limestone flux containing 49 per cent CaO; this means 157,140 units of fixed carbon (3 per cent moisture in 1800 lb. "commercial" coke = 54 lb. and 1800 — 54 = 1746; 1746 x 90 = 157,140).

If the percentage of fixed carbon in the coke used in any month is less than 90 per cent, then this lower percentage is subtracted from 90 per cent and the difference is doubled, and this amount is subtracted from 90 per cent to find the "available carbon." It is understood that each increase in ash requires an equal amount of carbon to take care of this ash and the limestone needed to flux it. The percentage of "available carbon" divided into 157,140 units will give the "comparative value" of that particular coke expressed in pounds of coke required for making 1 ton of basic iron, under the conditions given above as to analysis of ore mixture (51.50 per cent Fe natural).

If it should happen (and it occasionally does happen where clean coal is coked) that the coke contains more than 90 per cent fixed carbon, then the difference is doubled and *added* to 90 per cent to find the "available carbon." This shows the double advantage of low-ash coking coals, whether naturally clean or washed clean.

Ore Adjustment

The ideal tonnage of ore mixture required per ton of pig iron for any particular month is found by dividing 1.00 by the per cent theoretical yield of the ore mixture for that month, carrying the decimal to four places (the per cent of theoretical yield is taken from Cost Data Sheet No. 1, shown in the second instalment of this article). To check this result, the total tons of ore mixture (including all iron-bearing materials) should be divided by the ideal total tons of pig iron for that particular month.

The ideal price of the ore mixture for any month is the actual average price of all the ore and iron-bearing materials charged into the furnace (or melted in the casting ladle) during that month. This price is to be obtained from Cost Data Sheet No. 2 (shown in second instalment of this article), which is filled out each month by the accounting department.

Ore Allowances

In some companies it is the rule to add a certain small percentage to all recorded weights of ore and iron-bearing materials charged into the blast furnace, so as to take care of any shrinkages in handling the raw materials. This adjustment may be ½ or 1 per cent of the stockhouse weights as shown on the daily filling reports.

Whenever this rule prevails the actual tonnages and the "adjusted" tonnages should be shown on Cost Data Sheet No. 4. (See second instalment of article.)

Limestone Adjustment

The actual tons (2000 lb.) of limestone required per ton of pig iron for any particular month is found by dividing 49 by the actual average percentage of CaO found in the limestone used, whether this limestone be calcite or dolomite (this percentage is taken from Cost Data Sheet No. 1, shown in second instalment), and multiplying the result by 0.425 tons (850 lb. limestone being the basis). This gives the correction for the quality of the limestone.

Labor Adjustment

The basis for the "ideal" comparative cost for labor per ton of pig iron is the total number of hours shown on the standard force sheet for the blast furnace for a 24-hr. period and at the hourly rate found by dividing the total man-hours for a 24-hr. period into the total wages paid for that period, as shown on the standard force sheet.

The total daily hours and the total daily amount of wages divided by the ideal daily tons of pig iron will give the ideal number of hours per ton of pig and the ideal cost of labor per ton of pig respectively.

The actual average hourly rate of wages for any one month is found by dividing the total amount of money paid for wages that month (as shown on Cost Data Sheet No. 2) by the total "net hours of labor entering the labor cost," as shown on Cost Data Sheet No. 1. The actual number of hours of labor per ton of pig iron for any one month is found by making the several deductions, as shown on Cost Data Sheet No. 1.

In order to get a correct comparison of labor costs for two different blast furnaces, or for different monthly costs of the same furnace, much care must be taken to include all of the hours of labor and all the hourly wages paid, whether this labor is direct operating labor, or labor that is included in "service" or in "overhead." Although the regular cost sheet may include such indirect labor under other headings, yet it is the intention of the comparative cost system to put all labor hours and costs under the heading of "Labor." Only by such

By RALPH H. SWEETSER

methods can a true comparison be made.

Ideal Production of Pig Iron for Any Month

The ideal pig iron production of a blast furnace for any particular month is controlled by two variable factors, viz., the ideal pounds of coke required per ton of pig iron for that month, and the corrected theoretical yield (corrected as to allowances for shrinkage, if any) of the ore mixture for that month. The control of these two varying factors is largely in the hands of the management. There are times, such as in the depression of 1930-31, when the selection of a low-grade ore mixture is advantageous, especially where the volume of gas (blast furnace) is a desirable factor in the operation, and where there is already a surplus of pig iron. Usually, the richer the mixture is in iron, the lower will be the cost of the pig iron.

The ideal total amount of coke consumed in 24 hr. is a fixed amount, found by multiplying the cubic feet of working volume of the furnace by 60. This figure divided by the ideal number of pounds of coke per ton of pig iron (as found according to the directions given under coke adjustment) will give the ideal amount of pig iron to be produced per day with the quality of coke actually used that particular month. This daily tonnage multiplied by the number of days in the month will give the ideal tonnage of pig iron for the month to be shown on Cost Data Sheets No. 2 and No. 5.

This calculation can be reduced to a single factor that is used to multiply the corrected theoretical yield each month. This factor is obtained as follows:

$$\text{Factor} = \frac{\text{Corrected theoretical yield} \times \text{rated capacity}}{54.78}$$

The "rated capacity" is the tons of pig iron the furnace will make using coke with 90 per cent fixed carbon and ore containing 51.50 per cent Fe natural.

Excess Due to Management

If the management provides raw materials better than the ore, coke and limestone used as the bases of the comparative cost system as previously described, then the management is entitled to the "credits" that arise from the use of better materials. On the other hand, if the management provides lower grade materials, then there are debits against the management.

If the furnace plant is not running full on account of lack of orders, there will be certain increased costs which are debited against the management. The credits and debits are balanced and the net result is added to, or subtracted from, the ideal cost for the month to show how much gain or loss was due to the management.

The superintendent is responsible for what he does with the materials furnished by the management, but not for the quality and the prices.

Presentation to the Executive

The final analysis of the pig iron costs each month is made by the assistant to the executive in charge of operations, and is condensed on Cost Data Sheet No. 5. This single page contains a concise statement of the actual pig iron costs compared with the "ideal" cost for that month, and shows the reasons for excess costs or for costs less than the ideal.

This Cost Data Sheet No. 5 is submitted to the executive in charge of operations accompanied with a one-page letter commenting briefly on each of the six items of cost controlled by the superintendent (relining and depreciation costs are fixed by the management). A copy of this letter and

(*Concluded on advertising page 22*)

PIG IRON

COST DATA SHEET No. 5

THE COMPANY

COMPARISON OF IDEAL AND ACTUAL COSTS OF PIG IRON

FURNACE MONTH OF 19

FURNACE IN BLAST

BASIS FOR IDEAL COST	Tons	Lbs.	Units	Furnaces in Blast: One	Furnaces in Blast: Two
Ore	1.825	4088	210,532 Fe		Same
Coke	0.900	1800	157,140 C		Same
Stone	0.425	850	49,000 CaO		Same
Labor—Number Hrs. Per Ton Pig					
Supplies, per day per furnace					
Overhead, per day per furnace					
Relining Depreciation					

EXCESS DUE TO MANAGEMENT	Ideal Amounts Per Ton for This Month	Tons	Lbs.	Amt.
Total				

Ideal Cost at this Month's Prices and Analysis		Actual Cost this Month	
Ore		Ore	
Coke		Coke	
Stone		Stone	
Labor		Labor	
Supplies		Supplies	
Overhead		Overhead	
Relining and Depreciation		Relining and Depreciation	
Total		Total	
Due to Management		Cost of Materials	
		Cost above Materials	

EXCESS COST

	Tons	Per Ton	Per Cent	Causes
Ore				
Coke				
Stone				
Labor				
Supplies				
Overhead				
Total				

Tonnage	Monthly	Daily	Yield	Analyses	Labor
Ideal—			Theor.—	Fix. Carb. in Coke	Hrs. Labor per ton pig
Actual—			Actual—	CaO in Limestone	Tons Pig per Man Day
Diff.			Loss—	SiO_2 in Ores	
				S in Coke	

DATE DATA FURNISHED BY

Paving Blocks, Crossings and Floor Plates Made of Pressed Steel

PRESSED steel paving blocks, planks, railroad crossings for highways and floor plates are new products that have been brought out by the Truscon Steel Co., Youngstown, at its Cleveland works. These promise to broaden the use of steel for floors, walks, ramps and track crossings for highway and factory yards and wherever else a floor is needed that will withstand heavy traffic.

The manufacture of these products by stamping the tread in the plate is a departure from the common method of making floor plates by rolling the raised tread on the surface of the plates. The latter is a hot rolling operation, the plates being passed through a special set of rolls to form the tread. The rolled plates with a smooth under surface have the additional thickness of the tread. With the stamping process a raised design is pressed into the flat plate stock to provide the tread and the tread part is no thicker than the remainder of the plate. The pressed plates without the excess metal for the treads are lighter than rolled floor plates of corresponding thickness and are claimed to be equal to the latter in strength. The safety tread, as it is designated, is a herringbone pattern raised approximately 1/16 in. with sharp edges on the two sides. The treads are stamped in a 1500-ton hydraulic press.

The paving blocks are sections of flooring 12 in. square and 3 in. deep. The four sides, in which the tread is not stamped, are bent over to form the depth and also have a narrow inner flange on the under side. The blocks are filled with concrete before using. They are made with accurate dimensions so that they will fit together properly when laid. In laying, the joint between the blocks is filled with about ¼ in. of mastic.

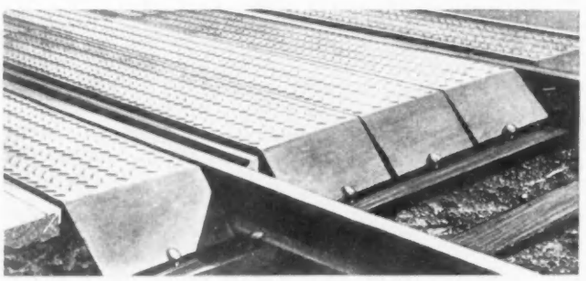
These blocks may be used for heavy-duty floors, being laid over a sand or concrete base, or for patching concrete, wood block or brick floors or pavements. They are claimed to be excellent for use around machines doing heavy work, as they provide a firm foothold for workers and resist damage from the impact of heavy weights dropping on the floor. The blocks are made in three thicknesses of material, ⅛, 3/16, and ¼ in.

The steel planks are made similarly to the blocks except that they have open ends. These are 6 in. wide, 3 in. deep, of the same range of thickness as the paving blocks. They are made in 9 and 18-ft. lengths. The planks are designed for heavy-duty floors, including floors used by steel-tired trucks. They are laid over a suitable solid base. If made of ⅛-in. plates, they are filled with concrete. Their weight holds them in place.

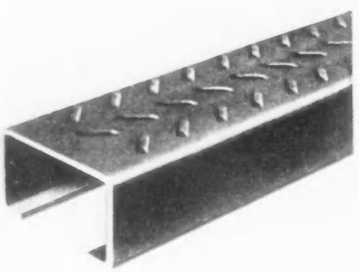
The highway crossings are similar to the steel planks except that they are made in one standard thickness of ¼-in. material, but can be supplied in two different types. One type permits the units to be laid lengthwise between rails and merely spiked through suitable countersunk holes into the cross ties on which they rest. The other design is of the slab construction, permitting the unit to be concrete filled, the combined weight of the steel and concrete being sufficient to hold the planks in place as laid on the ties without the need of spiking except at ends for location purposes, as illustrated in one of the photographs.

Important features of the floor plates are that they may be formed to any desired shape and may be made

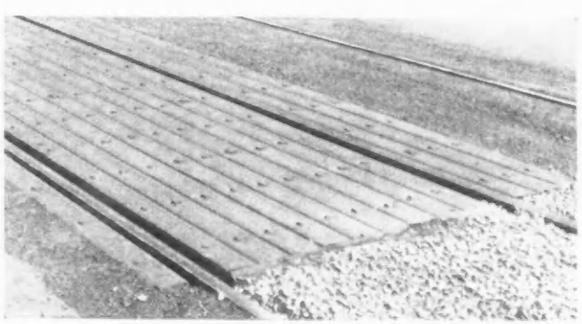
Paving blocks as used for repairing a floor, which has been subjected to excessive abuse.



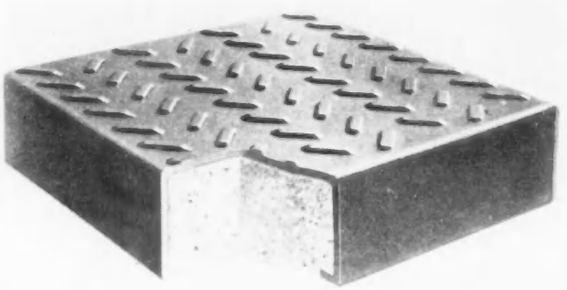
Safety-tread steel highway crossing, concrete filled.



Safety-tread steel plank.



Safety-tread steel highway crossing, spiked to existing ties.



The Truscon paving block filled with concrete.

to any individual specification with the tread only on certain areas where actually needed, for steps and various other uses, leaving the remaining surface of the material smooth. With these features the application of floor plates, it is claimed, has been broadened to include a wide range of uses. The standard floor plate is made with an over-all tread, in thicknesses from ⅛ to ¼ in., in various widths up to 48 in. and in both black open-hearth and copper-bearing steel.

An advantage of these new products, it is pointed out, is that they may be stocked in warehouses in standard sizes. A patent on the manufacturing process has been applied for.

Electric Screw Drivers with Adjustable Clutch

TWO new electric screw drivers featuring an adjustable-tension clutch have been placed on the market by the Stanley Electric Tool Co., New

Britain, Conn. One of these, the type 31, drives screws as large as No. 12—2 in. in hardwood with proper size lead holes, and may be used also with socket wrenches to run on nuts. This machine is 14⅜ in. long, weighs 8 lb., and has a full load speed of 235 r.p.m.

The second screw driver, the No. 32, will drive screws up to No. 16—3¼ in. in hardwood and lag screws up to 5/16 x 4 in. with proper size lead holes. With socket wrenches it will run on nuts up to ⅜ in. It is 15¾-in. long, weighs 9 lb., and has a full load speed of 275 r.p.m.

According to the manufacturer the adjustable tension clutch releases at the exact pressure for which it has been set, prevents sinking screws too deep into wood, and sets screws up tight to work. It is also said to prevent marring of the surface of the work, to eliminate the hazard of overloading motor and of stripping threads and to prevent damaging the screw slots. These screw drivers have aluminum alloy housings, nickel-steel gears, heat treated; automatic release safety switch with locking device, and a clutch guard cover that prevents accidental change of tension.

Corrugated stainless steel radiating surfaces are used on the new type E inclosed, fan-cooled induction motor marketed by the Lincoln Electric Co., Cleveland.

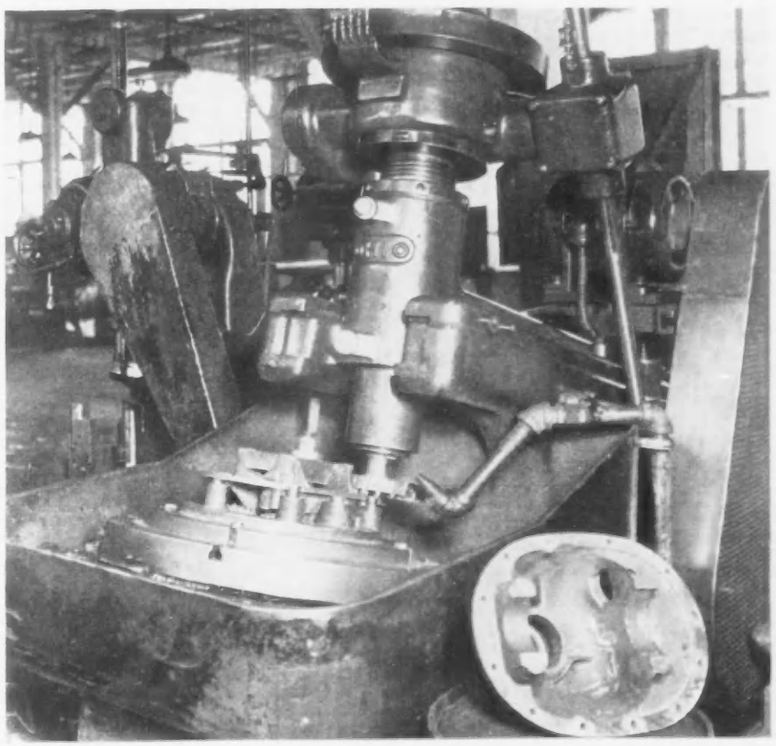
Differential Carrier Flanges Milled at a Two Minute Rate

THE milling of the face of an oblong flange on a differential carrier which is part of a rear axle assembly for an automobile and putting the job on an economical production basis was the problem that recently confronted the Columbia Axle Division, Cleveland, of the Auburn Automobile Co. Usually the center or enlarged part of the rear axle housing is round in form and has a circular flange, to the face of which is bolted the differential carrier having a flange and face of similar shape and dimensions. Milling of the circular faces presents no problems, as the work is done on a standard lathe or milling machine.

Housings and differential carriers of the oblong design are used in those models of Auburn cars that are provided with two axle ratios in the same car, this feature being designated as the dual ratio. Shifting from one ratio to another is through a control on the instrument panel.

The oblong face of the differential carrier is approximately 14 in. wide and 22 in. long. This face is milled on an Ohio tilting type milling machine. In the ordinary operation of this machine four pieces are mounted in fixtures in a revolving table and the head of the machine moves in and out as the table indexes. To provide a machine that would mill a face oblong in form the head was equipped with special cams and gears so that the cutter feeds back and forth and at the same time follows the contour of the flange of the casting. On the inner side of the casting close to the flange is a projecting section which forms the cross bore. The movement of the head is so controlled by the cams that the cutter avoids feeding into the legs of this section of the casting. An inserted tooth type milling cutter 12 in. in diameter is used for the oblong milling operation. A ⅛-in. cut is taken.

While machining the piece is held in a special tapered fixture. The nose or smaller end of the casting that is opposite the flange that is to be faced is set in a bellmouth type bushing in the table and is clamped down. The sides of the castings rest on four stationary stops and three drivers are provided to keep the casting from turning sideways. The flanges of differential carriers are faced on this machine at a speed of one in two minutes including loading and unloading time.



Oblong face of differential carrier shown at right is machined on a tilting type milling machine rebuilt with special cams and gears so that the milling cutter follows the contour of the flange. Picture shows the set-up of the casting for milling.

Rotary Surface Grinder with Three Wheel Heads

THE center-column type rotary surface grinder recently brought out by the Hanchett Mfg. Co., Big Rapids, Mich., is intended for a wide variety of surfacing operations. The large circular revolving table is designed to receive numerous types of fixtures, including rotary magnetic chucks; and the three built-in motor-driven grinding wheel heads permit taking roughing, semi-finishing and finishing cuts without removing the piece from the fixture, a feature emphasized as making for high production, with close accuracy and fine finish.

With the grinding wheel heads mounted on a central column, the machine is accessible from all sides. The patented grinding wheel head adjustment employed is said to make possible accurate alinement of the wheel heads parallel with the plane in which the work table travels. Furthermore, the heads can be readily set to give clearance on the back edge of the grinding wheels. There is a vertical feed of 6 in. for each head, and a height of 10 in. under new grinding wheels.

The ring-type table is 72 in. in diameter, 16 in. wide and is driven through a large helical ring gear and pinion. The pinion shaft is driven from a worm and worm gear from a variable-speed drive unit and 3-hp. motor. The table has a speed range of ¾ to 3 r.p.m. and is started and stopped through push buttons.

Grinding wheels are 18 in. in diameter and 3 in. high, and different face widths can be supplied. Hanchett Red Anchor cylinder wheels, cylinder wheels held in chucks, or segmental cylinders can be furnished. Each wheel is driven by a 15-hp. motor at a surface speed of 5400 ft. per min.

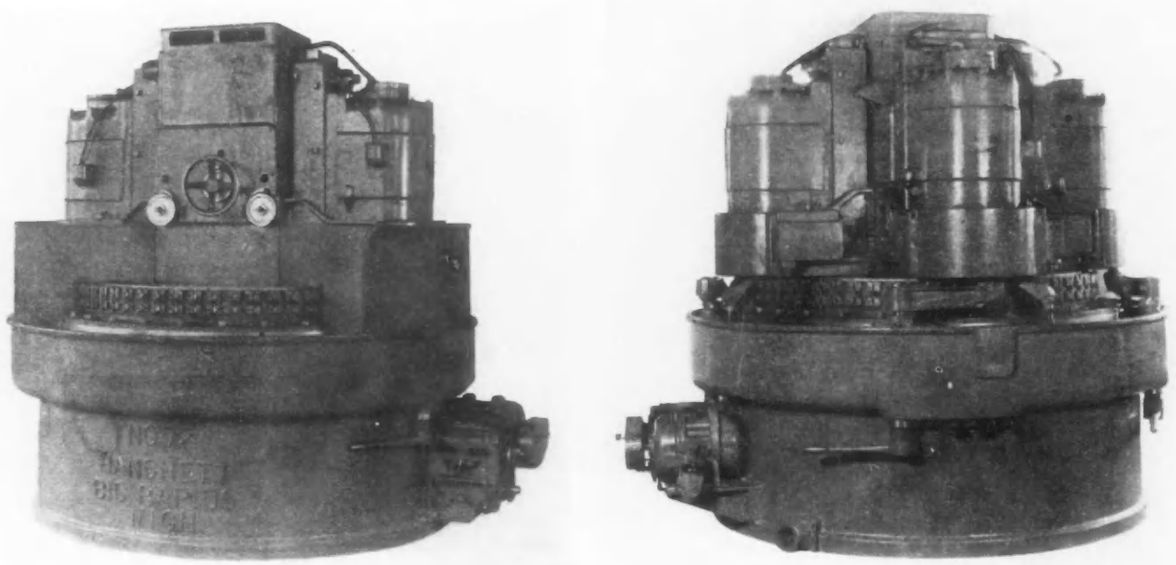
Grinding-wheel spindles are lubricated by oil pumped from a tank to a reservoir mounted at the extreme top of the machine. From this reservoir the oil drains to the top bearing of each spindle, from which it flows through piping with sight glass to the bottom bearings, then draining back to the main tank. A Purolator is employed in the system. The circular table is lubricated by means of oil wells in the V-ways; all other bearings are Alemite lubricated. Provision is made for ample supply of coolant.

Vertical feed of the grinding heads is obtained automatically. Each head feeds down exactly the same amount as the wear of each grinding wheel. If desired, the automatic control can be omitted and the machine supplied with manual control. The wheel dresser provided for each grinding wheel head can be set to dress the wheels exactly parallel with the plane of rotation. The dresser heads are of ball-bearing type.

Without fixtures, the weight of this machine, which is designated as the No. 72, is 22,000 lb.

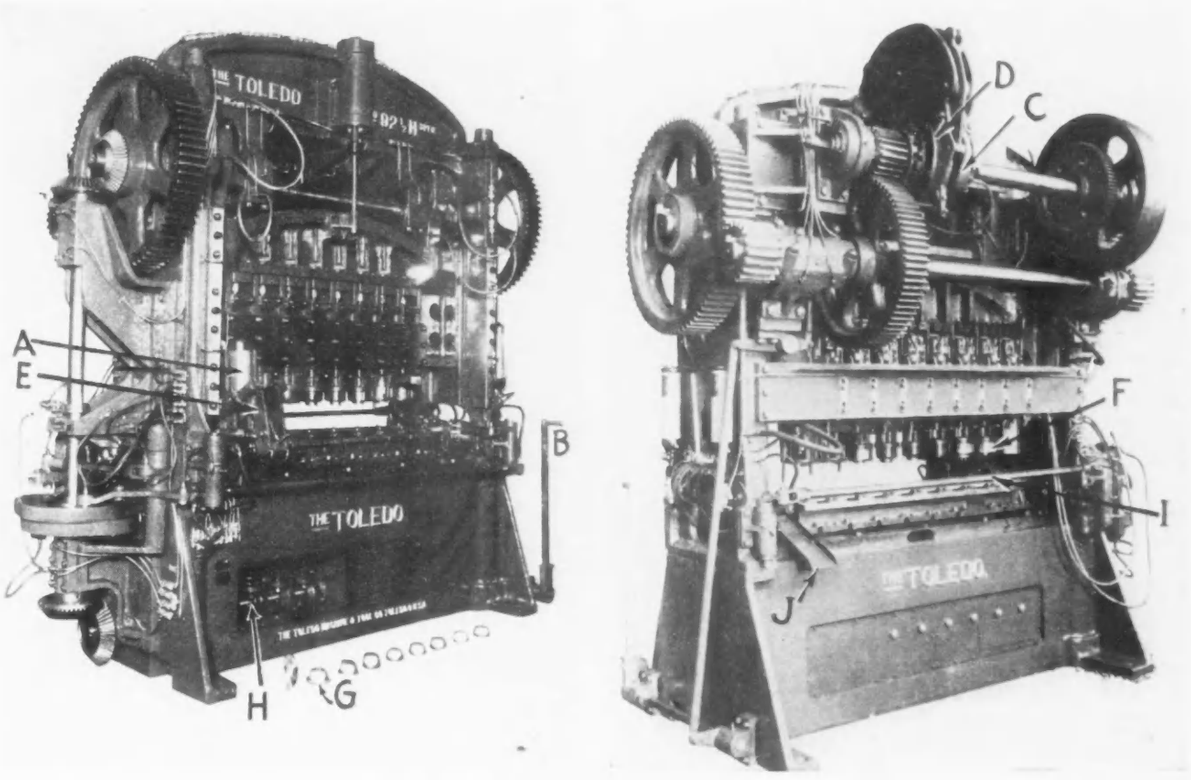
Develops Device to Eliminate Machine Vibration

A DEVICE which may be of interest to machine tool builders is in the development stage at the laboratories of Thomas A. Edison, Inc., Orange, N. J. The principle of the mechanism is an invention of Theodore M. Edison, who states that the purpose is to eliminate or greatly reduce vibration from mechanisms which are subjectable to forces tending to set up such vibration. Mr. Edison describes his invention as a system made up of elastic means coacting with masses so as to have a natural periodic vibration which may be varied through wide limits. If such a system is applied to a mechanism with a constant period of vibration it is possible to exactly neutralize such vibration. Mr. Edison says that because of the interest of the metal-working industry in this subject he is working on a new model of more practical character and that with this model he hopes to develop some interesting results applicable to industrial machinery.



At left the rotary grinder is shown equipped with tappet valve grinding fixture and with splash guards in place. The rear view at right shows the three built-in motor driven grinding heads, also the three wheel dressers and the coolant nozzles, the splash guards having been removed.

The feeding mechanism automatically carries the stainless steel shells across the dies, eliminating all handling between successive operations. Completed shells are discharged at rate of 30 pieces per min. into the chute shown at J in rear view at right.



Double-Crank Press Equipped with Special Feeding Mechanism

A DOUBLE-CRANK press equipped with eight dies for producing an eight-operation stainless steel shell has been completed recently by the Toledo Machine & Tool Co., Toledo, Ohio. An outstanding feature is the special automatic feeding mechanism, which entirely eliminates all intermediate handling between the several independent operations required to finish the piece.

The press runs continuously. It completes 30 pieces a minute, which means an actual performance of 240 operations a minute. The piece produced is a special conical shaped shell of No. 24 U. S. gage stainless steel, made from a blank that is 6¼ in. in diameter. When finished, it is about 2 in. deep and 4¼ in. in diameter, and has a number of holes, bosses and flanges in the bottom.

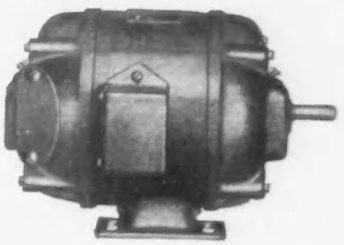
Operation is as follows: After the blanks, which have been cut previously, are stacked in place in the large feed tube *A*, the machine is started by throwing in the hand lever *B*. This hand lever operates an improved multiple disk friction clutch, *C*, and brake *D*, which gives the operator complete control of the press and the feeding mechanism at all times.

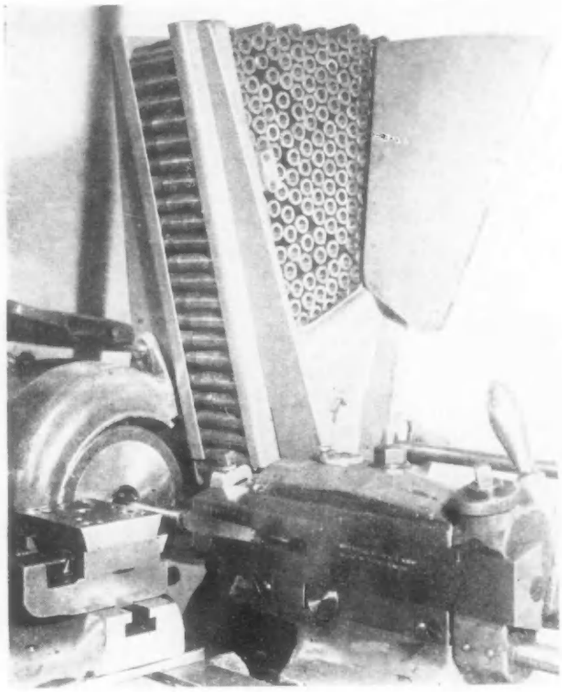
With the clutch engaged, the feed *E* pushes the blanks into the first operation forming die, *F*. The shell, *G*, produced in the first operation, is ejected from the die by a positive knockout in the punch and a cam-actuated knockout, *H*, in the bed. At this point the shell is caught by a so-called cut-and-carry feed, *I*, by which it is carried successively under the several punches until the shell has been finally completed and is discharged at the chute *J*.

The press is also adapted for the production of a large variety of similar work, such as wheel hub covers, reflectors, lamp and lantern bodies and parts, kettle breasts and milk separator shells. It is of double-crank type with twin gears on the crankshaft, and is driven by a direct geared 15-hp. motor. The distance between the uprights is 84 in. Each of the eight punch slides is individually adjustable, and is counterbalanced by a pair of air cylinders to assure smooth running. In addition to the cam-actuated knockout in the bed there is also a pressure attachment for operating the draw ring. Constant lubrication is provided by means of a special system. The total weight of the press is approximately 45,000 lb.

Brush-Riding Single-Phase Induction Motor

BRUSH-RIDING single-phase repulsion start induction motors, intended primarily for those applications where the most quiet operation or the higher operating characteristics are not required, have been placed on the market by the Century Electric Co., St. Louis. These motors do not replace the Century line of brush lifting motors for long hour per year applications, such as refrigerators, oil burners, etc.





THE belt feeder shown above handles 100 tons of sand an hour. A load of 300 valve stems, a 75-min. supply, is carried by the new P&W automatic lathe magazine at left.

New Magazine for P & W Full Automatic Lathe

WITH the development of a new magazine, the loading capacity of the 1 in. x 18 in. full automatic lathe, built by the Pratt & Whitney Co., Hartford, Conn., has been greatly increased. The illustration shows this magazine set up for cast-iron automotive valve stem guides, 300 pieces comprising one full load. This represents about a 75-min. supply of work, as the valve stems are machined in 15 sec. each.

The valve stem has an overall length of 3 13/16 in. and a turned diameter of 11/16 in. The turned length is 2½ in., and the ends are faced during the turning operation. This turning operation is followed by centerless grinding, 0.006 in. stock on the diameter being left for this purpose. Reduction in labor cost of operating automatic lathes is claimed, since with the larger-capacity magazine one operator can handle several more machines.

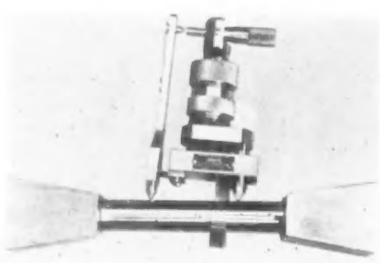
A hinged door is provided on one side of the magazine, as shown, to facilitate loading. The work is placed with corresponding ends all one way. An agitating device in the bottom of the magazine prevents any jamming of work. This magazine can be used also for small steel parts.

Extensometer for Oxweld Portable Testing Machine

TO permit determining the yield point of specimens being tested in an Oxweld portable tensile testing machine, the Linde Air Products Co., 30 East Forty-second Street, New York, is introducing the extensometer illustrated. The sensitivity is said to be such that it will indicate the elongation in a standard A. S. T. M. test specimen occasioned by the heat of the human hand. Although highly sensitive, the instrument is rugged; it is self-contained and self-compensating.

The two points of the extensometer are clamped on the test specimen in such a manner that the elongation between the two points during tension is multiplied in a ratio of 5-to-1 by a lever bar making electrical contact with the micrometer head. The moment of contact is indicated by the flash of a small electric light in the extensometer head. This feature makes it possible for the one operator to determine both the ultimate strength and the yield point of a specimen.

The extensometer may be used also as a strain gage to determine the elongation of a specimen under a specific load.



Portable Belt Feeder Unloads Hopper Cars

THE portable troughed belt feeder illustrated, a new product of the Fairfield Engineering Co., Marion, Ohio, is designed to facilitate unloading of sand, coal, coke and other loose bulk materials from hopper bottom cars. It receives the material as it drops from the hopper, carrying it to a portable or stationary conveyor or elevator. It is stated that 40 tons of coke, 60 tons of coal, or 100 tons of sand may be handled hourly.

The feeder is 18 in. wide and 14 ft. long, and is powered either by a 3-hp. electric motor or a 4½-hp. air-cooled gasoline engine, which drives the head shaft through steel roller chain and sprockets. The 18-in. wide rubber belt is fitted with flat cleats on close centers and its edges are amply protected. Replaceable wear angles are fitted to the feeder frame, as shown, to hold the belt in position at the curved section. The carriage wheels are mounted on spindles that can be lowered as much as 8 in. to compensate for difference in the level of the yard where the machine is used. Pressure lubrication is provided throughout. The machine weighs 1350 lb.

Micrometer Parts Faced with Tungsten Carbide

ONE-INCH micrometer calipers with the ends of the spindle and anvil faced with tungsten carbide have been announced by the Brown & Sharpe Mfg. Co., Providence, R. I. Sixteen different styles are offered, including the black frame style, the conventional bright-finish U-frame micrometer and micrometers for measuring in 0.0001 in. They are not carried in stock, but can be furnished on short notice. The hard alloy measuring surfaces make these tools especially suitable where micrometers are subject to severe wear.

Trade Associations Must Combat Profitless Selling

Charles F. Abbott Says Cooperative Efforts Are Needed to Effect Business Recovery

RESTORATION of the vanished profit margin is an essential to recovery and can best be fostered through industrial trade associations, according to Charles F. Abbott, executive director, American Institute of Steel Construction, who, at Charlottesville, Va., on July 8 addressed the Institute of Public Affairs under the sponsorship of the University of Virginia.

"During 1931," said Mr. Abbott, "the steel industry that consumes the most valuable of all natural resources, sold approximately 20,000,000 tons of finished steel products and paid $1 per ton for the privilege of doing so. More than $20,000,000 was lost. Similar large losses were absorbed by other important basic industries.

"Unless price-cutting can be stopped and prices advanced to the point where they will show a reasonable profit, then wages must be further reduced, increasing the volume of unemployment. Wage scales cannot be maintained and the unemployment problem cannot be solved unless profits can be realized.

"The only known relief from our present difficulties is through the activities of our industrial trade associations. Industrial associations are not only essential in promoting progress, but they are a necessary benefit to members, to customers and to the public. Most of the problems that confront the individual business man are shared equally with his competitors, his customers and his public. He cannot solve them alone. Success will depend upon the cooperation of all interests involved.

"Certainly no fair-minded business man wants to encourage any interference with the economic law of supply and demand during normal times. Price regulation or restraint of competition is not to be desired, but when business sinks to the low levels of the past two and a half years then there are grounds for exceptions. Public welfare becomes involved and it is far better to apply war-time measures of relief if in doing so our business interests can be saved and employment preserved.

"There are many who feel that it should be illegal to sell below the cost of production and particularly for the purpose of injuring a competitor, and that more flexibility be incorporated in existing laws to apply in times of depression or national emergencies.

"The public is demanding that industry produce plans that will preserve employment and that call for some system of stabilizing output.

"Under the control of the Federal Trade Commission or some other governmental agency, there is no doubt but what progress could be made in removing much of the destructive competition that has ruined prices and profits and created a toll of waste that is against the best interests of the public.

"The Swope plan in its demand for compulsory membership in a trade association, the proposed National Economic Council and other similar movements are all indicative of public thinking. The handwriting on the wall is clearly visible for those who wish to observe and heed its message.

"If there was ever a time when trade associations should receive united moral and financial support it is during periods of distress. It is then that the combined energies of an industry should be set in motion and move forward aggressively. It is no time to retire or withhold support. It is folly for anyone to believe that individuals can prosper at the expense of their industry. The interests of each are so closely related that one depends upon the other. Those who withhold support are actually the ones who are preventing the progress in which they themselves are most concerned."

Officers Nominated for Mechanical Engineers

Nominations for officers of the American Society of Mechanical Engineers for the year beginning in the first week of December were announced at the summer meeting of the society held last week at Big Win Inn, Lake of Bays, Ontario, Canada. Ballots will go to the membership in the regular course and election will be completed in time for the successful candidates to become familiar with their duties before actively taking office. The candidates are as follows:

For president, A. A. Potter, dean of the schools of engineering, Purdue University, Lafayette, Ind. Vice-presidents: Harold V. Coes, Ford, Bacon & Davis, New York; Clarence F. Hirshfeld, research department, Detroit Edison Co.; James D. Cunningham, president, Republic Flow Meters Co., Chicago. Managers: R. L. Sackett, dean of engineering, Pennsylvania State College, State College, Pa.; Alex. D. Bailey, superintendent generating stations, Commonwealth Edison Co., Chicago; John A. Hunter, professor of mechanical engineering, University of Colorado, Boulder, Colo.

Nominations of representatives of the society on the American Engineering Council included the following: Blake R. Van Leer, dean of engineering, University of Florida, Gainesville, Fla.; Prof. Joseph W. Roe, New York University; D. Robert Yarnall, Yarnall-Waring Co., Philadelphia; Dean B. M. Brigman, University of Louisville, Louisville, Ky.; Ernest Kreher, president, Tampa Shipbuilding & Engineering Co., Tampa, Fla.; Prof. Hugo Diemer, LaSalle Extension University, Chicago; William A. Hanley, Eli Lilly & Co., Indianapolis.

Bethlehem Company to Build Oil Burner

The Bethlehem Foundry & Machine Co., Bethlehem, Pa., has acquired control of the Oil-Elec-tric Engineering Corpn., Minneapolis, Minn., maker of the Doe Oil-Elec-tric burner, which will now be manufactured at the Bethlehem plant. The present Minneapolis plant will be used as a direct factory branch.

The oil burner department will be operated as a separate division of the Bethlehem Foundry & Machine Co., whose business, since 1856, has been the manufacture of chemical processing equipment and metallurgical roasting furnaces.

Displays Rebuilt Machines in Metropolitan Area

The Simmons Machine Tool Corpn., Albany, N. Y., invites inspection on or about July 15 of their new display rooms and machine tool warehouse in Jersey City at the entrance to the Holland Tunnel. The machines as well as accessories of all kinds are rebuilt and conditioned at the Albany plant of the company and are ready for immediate shipment from the warehouse in Jersey City, which has railroad siding and is equipped with cranes to facilitate handling.

Steel springs to the value of $16,738,371 were manufactured in 1931 by 85 establishments reporting to the Bureau of the Census, reflecting a decline of 66.7 per cent of the 1929 value of $50,298,875 reported by 86 establishments. Wire springs are not included in the reports.

PUTTING THE QUESTION MARK TO WORK

— 27 —

Alloy Wrought Iron

Do you know of any cases where wrought iron is being successfully alloyed to change some of its characteristics?

R. T. U.

SEVERAL steel companies have experimented with a wrought iron alloy by introducing into wrought iron, copper, nickel and other elements. The earlier experimental work apparently was not commercially successful but recently some producers are taking new interest in this subject. We are not making an alloy of wrought iron ourselves but we have a report from a company now in production on wrought iron alloyed with nickel and molybdenum and with copper and molybdenum. Excellent fatigue resisting properties are claimed and the alloy is said to show a substantial increase in strength under heat treatment.

E. V. T.

— 28 —

Welding Malleable Iron

In order to reduce the cost of manufacture of long thin malleable iron tools used in a glass manufacturing plant, we would like to cast small sections and weld them together later. Is this practical?

A. A. F.

GENERALLY speaking malleable iron has not been welded successfully except in special cases where the outer surface of the casting has been decarburized. A manufacturer of large power shears is successfully welding a blade of steel on to a malleable casting but it has taken him some time to develop this operation. We are successfully spot welding cold rolled sheet steel to malleable castings. We find that it is necessary to have the thickness of the casting about twice that of the steel for satisfactory results. We are also successfully brazing malleable iron parts.

A. M. I.

— 29 —

Selecting the Electric Motor

Does a squirrel cage induction motor make a good drive for starting and stopping an inertia load?

P. B. R.

YES, from the point of view of simplicity of control, but the duty cycle must be checked very carefully to make sure that the motor will stand the heating. For equivalent frame sizes, direct current motors are able to make more reversals per minute than an induction motor without overheating. In requesting a proposition from a manufacturer, the user of such a motor should clearly specify the duty cycle and give some idea of the friction load.

T. R. R.

IN the shops of the General Electric Company, during this depression, we have found it advantageous to do many jobs of maintenance and rehabilitation which, in normal times, might be difficult to carry out due to occupancy of the buildings. This has furnished a considerable amount of work for our employees, and places our equipment and shops in better condition for future use. By doing this we have gone a long distance in helping both employees and the company.

B. L. Delack,
Schenectady Works Manager,
General Electric Company

* * *

A MACHINE TO HELP THE UNEMPLOYED

"WHAT kind of a machine can we use to chop up or grind up old shoes complete as they come, including wooden heels and nails, so that this material can be transformed into a product of commercial value?" This question is one of many which are being received and answered through this department. In this case, however, the question is unique as it comes from a charitable organization of California which gives employment to some 500 people through the renovating, repairing and reclaiming of cast-off materials. Therefore if you can furnish information which will help this California group in locating a suitable machine for its needs you will be contributing to the relief of unemployment. Please address your answer to Forum Editor, Iron Age Publishing Co., 239 W. 39th Street, New York.

* * *

This Question and Answer feature appears bi-weekly and is offered as a clearing house for every day problems in the metal working industry. Perhaps you too have a question or problem.

— 30 —

Grinding Pencils for Dies

In one of your recent items on die sinking it seemed to me the labor charge was unduly high. Were mechanical die sinkers and grinders used?

T. C. B.

IN a jobbing forge shop such as that referred to most of the work is of special character which does not warrant expensive tool equipment. Recently the use of small grinding pencils has been adopted with a considerable saving. Small, abrasive pencils are now available for internal grinders permitting the accurate grinding of holes 4 to 6 millimeters in diameter. The use of molded abrasive points of various shapes and types is helping to cut down the labor expense by replacing the slower hand tools such as files, scrapers and chisels. Portable grinders designed especially for die work have been developed to run at speeds in excess of 60,000 revolutions a minute.

N. C.

— 31 —

Rumors of a Tin Plate Mill*

Can you give any information in connection with the persistent rumors that a tin plate mill is to be established in South America?

F. J. K.

THESE rumors probably referred to a scheme of the Melingriffith Tinplate Co. of Wales, England. In 1930 that firm sent a man to Buenos Aires to investigate the possibility of establishing a tin plate mill in this country, and in December, 1930, it sent out a film which was shown under the auspices of the Union Industrial Argentina. This latter organization is a union of the Argentine manufacturing plants and its president is Senor Luis Colombo, who is an ardent protectionist. At the time the film was shown some of the local papers urged the establishment of a tin plate industry in this country and some of the local consumers of tin plate approached the Ministry of the Provisional Government on the subject. However, nothing has developed and it is the general opinion of the steel trade in this country that the establishment of a tin plate mill in this country would not be practical unless the present import duties were considerably increased. No steel is produced here and it would have to be imported from Bolivia or elsewhere. The existing customs duties on tin plate are very small, being only a few dollars per ton higher than those on the steel sheets which would have to be imported to serve as the basis.

A. V. D.—Buenos Aires

**Answer submitted by U. S. Commercial Attaché Alexander V. Dye, Buenos Aires.*

Attacks on Steel Prices Are Answered by Sheet Association

Flat Rolled Manufacturers Organization Presents Study of Declines That Have Occurred Since 1920

THE National Association of Flat Rolled Steel Manufacturers, through its president, George H. Charls, Terminal Tower Building, Cleveland, has issued a bulletin setting forth the deflation in steel prices that has occurred since 1920.

"That steel prices were the barometer by which the 1929 depression might have been foretold, and may be the indicator which will first mark its end and the beginning of an upward trend, can be read in an analysis of steel prices and wages," says the bulletin.

The association comments upon the "evils of over-expansion forced upon many industries during the war" and declares that "a close study of price trends in such basic industries as steel could have served as a warning since 1923 of the blow that was to fall six years later."

Cites Large Financial Losses

To present a picture of the excessive deflation that has occurred in the steel industry during the depression, the association gives the following figures, showing the losses of 19 steel companies in the first quarter of this year, as follows:

Allegheny Steel Co.	$366,378
American Rolling Mill Co.	571,917
Bethlehem Steel Corpn.	3,685,769
Colorado Fuel & Iron Co.	399,278
Eastern Rolling Mill Co.	169,751
Follansbee Brothers Co.	301,196
Gulf States Steel Co.	144,196
Granite City Steel Co.	37,896
Inland Steel Co.	820,541
Interlake Iron Corpn.	391,495
Jones & Laughlin Steel Corpn.	2,399,089
Ludlum Steel Co.	50,920
Newton Steel Co.	126,132
Otis Steel Co.	701,162
Republic Steel Corpn.	2,476,292
Superior Steel Corpn.	150,644
United States Steel Corpn.	13,218,549
Youngstown Sheet & Tube Co.	3,057,736
Wheeling Steel Corpn.	823,137
Total	$29,892,078

Pig Iron and Steel Decline Since 1920 About 55 Per Cent

The bulletin then takes up the statements that have been made that iron and steel prices have not been deflated to the extent that have general commodity price levels, and points to the fact that the average price of pig iron and steel, as of June, 1932, is about 55 per cent below the 1920 average. Although the association in its analysis does not separate pig iron and steel, THE IRON AGE composite prices show that finished steel declined during this period about 43 per cent and pig iron about 67 per cent. The association points out that the decline in the general commodity price level, as shown by Dun's compilation, has been 45.5 per cent.

"In the 1920 slump," says the bulletin, "steel prices not only dropped with all other commodities, but continued the downtrend to a lower point. Whereas all commodities started up in the middle of 1921, it was not until the middle of 1922 that steel started its rise. Exactly one year later, in the middle of 1923, came the fork in the road where steel prices started a long downhill journey, while commodity prices either maintained their level or increased."

Some observers who have questioned why steel has not registered the same decline as other commodities since 1929 have overlooked the steady and precipitate decline going on in steel since 1923.

A Study of Wage Rates

"Another interesting picture results in a study of the trend of average hourly wages in the steel industry as compared with all industries during the same period. At the same time that steel prices started a sharp decline in 1923 hourly wage rates in the steel industry started a sharp rise. From that time until the middle of 1923 we find steel wages on a higher level than the average wages for all industries, with steel prices declining all of the time. This explains why today the average wage in all industries has declined only 16.1 per cent while steel wages have dropped 29.5 per cent, a reduction of 13.4 points more than the average for all industries."

The association has illustrated this point in a chart, which is reproduced.

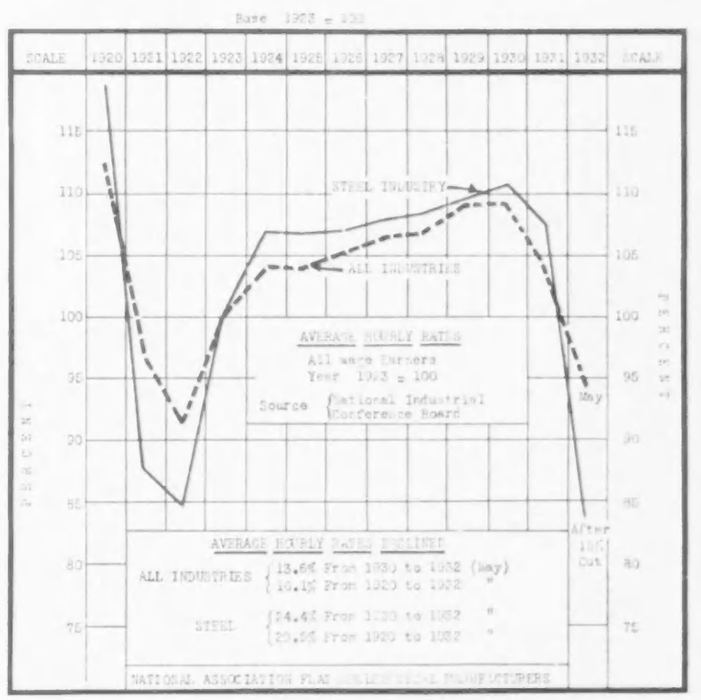
Declines Shown with Adjustments for Higher Freight Rates and Taxes

Another study by the association is a comparison of steel prices today with the average for 1910 to 1913, inclusive, with adjustments which give effect to the increases in railroad freight rates and taxes that have occurred since that period. This table follows:

	Below 1910-1913 Level (Per Ton)
Nails	$3.24
Bars	4.56
Structural shapes	4.76
Black sheets	3.40
Galvanized	6.20
Hot-rolled strip	8.20
Cold-rolled strip	30.20
Sheet strip or blue annealed	6.00

The association has also presented the results of a study of the decline

(*Concluded on page* 44)


Base 1923 = 100
SCALE
1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932
STEEL INDUSTRY
ALL INDUSTRIES
AVERAGE HOURLY RATES
All wage Earners
Year 1923 = 100
Source National Industrial Conference Board
May
AVERAGE HOURLY RATES DECLINED
ALL INDUSTRIES 13.6% From 1930 to 1932 (May)
16.1% From 1920 to 1932
STEEL 24.4% From 1930 to 1932
29.9% From 1920 to 1932
After 10% Cut

A chart prepared by National Association of Flat Rolled Steel Manufacturers comparing reduction in hourly wage rates by steel industry and all industries.

New Managing Director for Management Society

John G. Goetz, for the past 12 years assistant to the president of the National Industrial Conference Board, has been appointed managing director of the American Management Association, to succeed Dr. W. J. Donald,

JOHN W. GOETZ

who has resigned to become a member of the management engineering and accounting firm of James O. McKinsey & Co., New York and Chicago. Before joining the conference board, Mr. Goetz was for several years with the General Electric Co., first in the factory department, then as office assistant and field representative in the offices of Owen D. Young. He has also had executive contacts in the steel industry.

Dr. Donald has been managing director of the A. M. A. for more than 10 years and has also been an elective vice-president of the association. He will continue as vice-president in charge of conferences and programs, and also as vice-chairman of the packaging exposition council of the A. M. A. Headquarters of the association are at 20 Vesey Street, New York.

A.S.A. Approves Plug and Ring Gage Standards

An American standard for plain and thread plug and ring gage blanks has been approved by the American Standards Association. This standard, developed by the American Gage Design Committee, includes terminology and details of construction for plain cylindrical plug gage blanks and handles; thread plug gage blanks and handles; plain ring gage blanks; and thread ring gage blanks. It also covers taper plug and ring gages for checking taper lock handles and gaging members.

The American Gage Design Committee, of which Col. J. O. Johnson, ordnance department, United States Army, is chairman, was not formally set up under the auspices of any particular organization, but consists of a representative group of manufacturers and users of gages. When the committee's report, now approved as an American standard, was completed it was published and placed at the disposal of American industry by the Bureau of Standards, and later was approved by the bureau as a commercial standard. The gage design committee was organized in December, 1926.

Sheet and Tin Mill Men Accept New Wage Scale

The Amalgamated Association of Iron, Steel and Tin Workers has completed an agreement with the Western Association of Sheet Steel Manufacturers, providing for a reduction in the wage scale for the 1932-33 year. Under the new plan, which is effective July 1, a base rate of $2.50 is applied to sheet mill employees, and each 5c. rise or fall in the average sales price of 26, 27 and 28 gage sheets results in an adjustment of 1½ per cent in wages. The reduction amounts to 15 per cent. The reduction in tin mill wages amounts o 10½ per cent.

The bi-monthly bar iron wage settlement for the July-August period also calls for a reduction in the wages of puddlers. The new card carries a 1.50c. rate, as compared to a 1.65c. rate in the May-June period. The new card entitles the puddler to a rate of $9.30 a ton, as compared to $10.05 under the previous arrangement.

Canada Rules U. S. Taxes Add to Values of Goods

WASHINGTON, July 5.—Instructions issued by the Canadian Department of National Revenue provide that the value of imported goods subject to excise taxes in the United States is to be increased by the amount of the taxes for the assessment of a regular duty, and, in addition, a dumping duty is to be collected equal to the taxes, according to reports from Assistant Commercial Attaché O. B. North, Ottawa. Among products mentioned in the bulletin as being subject to excise taxes are automobiles, parts and accessories, firearms, radio apparatus and mechanical refrigerators.

An illustrated bi-monthly miniature newspaper, *Nickel Steel Topics*, devoted exclusively to nickel alloy steel, has recently been inaugurated by the International Nickel Co., Inc., New York.

Harold Iron Mine Is Safety Contest Winner

WASHINGTON, July 5.—Of the metal mines engaged in the Bureau of Mines national safety competition of 1931, the winner was the Harold iron mine, Carson Lake, Minn., operated by the Hanna Ore Mining Co. During 196,-316 man-hours of operation, this mine had no lost-time accident. Announcement of the winners was made last week by Scott Turner, director of the Bureau.

In the group comprised of quarries and open cut mines, the winner was the Mahoning open cut iron mine, Hibbing, Minn., operated by the Mahoning Ore & Steel Co., which worked 339,722 man-hours without a lost-time accident. In the bituminous coal mine group honorable mention was given Rockhill No. 8 mine of the Rockhill Coal & Iron Co., Robertsdale, Pa., and Virginia mine of the Gulf States Steel Co., Bessemer, Ala.

Honorable mention was given to the following in the metal mining group: Bennett iron mine of the Bennett Mining Co., Keewatin, Minn.; Warner iron mine of the Hemlock River Mining Co., Amasa, Mich.; Eureka-Asteroid iron mine of the Castile Mining Co., Ramsay, Mich., and Montreal iron mine of the Montreal Mining Co., Montreal, Wis. Honorable mention also was given to numerous open cut iron mines for operating without a lost-time accident.

Metal Tile Must Not Be Designated as "Tile"

WASHINGTON, July 5.—Designation of an imitation tile as tile unless properly qualified is prohibited in an order of the Federal Trade Commission to Metal Tile Construction Co., Inc., New York. Metal Tile's product is described as a "zinc plate upon which is imposed a coat of enamel, varying in color to imitate the common colors of genuine tile, whether domestic or imported."

Carboloy Prices Reduced

Substantial price reductions on all sizes and designs of Carboloy cemented carbide blanks and tools have been announced by the Carboloy Co., Detroit. The new prices are based on a sliding scale according to the weight of this cemented carbide in any given tool, and include milling cutters, reamers, spot facers, drills, counterbores, form and other tools. This price reduction, the first since Sept. 1, 1930, is emphasized as not only permitting greater savings on existing Carboloy tool applications, but also as widening the range of jobs on which such tools can be applied economically.

Economic Conferences Focus Attention on International Difficulties

By DR. LIONEL D. EDIE

THE season of conferences on world economic affairs is in full swing and the remainder of 1932 will witness at least four major efforts to find a way to recovery by surmounting international difficulties. The following conferences deserve particular attention:

At Geneva	Disarmament
At Lausanne	Reparations
At Ottawa	British Empire problems
At London	Monetary problems

Geneva—Security Not Assured

The Geneva conference on disarmament has already been running so long that public interest in its activities is difficult to sustain. President Hoover's proposal to cut armaments one-third temporarily seized the imagination, but the cool reception given to the Hoover plan by certain countries has forced the outside world to doubt whether anything will come of it.

The real battle at Geneva is not between plans, but between basic ideas. On the one hand is the idea, particularly entertained by the French, that security comes first, disarmament later; that further guarantees of security are necessary before further disarmament is possible. On the other hand is the idea, particularly fostered by the United States, that disarmament should come first and immediately; that further disarmament is practical here and now, while effort to increase security of all nations goes on apace.

This clash of national philosophies explains why progress has been lacking at Geneva. As against the sense of insecurity on the part of certain nations, it is of no avail to argue that the cost of armament is a burden tending to prolong world depression. Nationalistic fear is a much more dominating motive than a vague sense of economy. Central Europe is afraid that smoldering national ambitions relating to territorial boundaries or treaty rights cannot be peacefully adjusted. That is the underlying fact which Americans, in their remoteness from Europe, have failed to recognize.

Lausanne—Reparations Are Ended, But Problem Is Not Settled

Reparation payments were terminated in July a year ago. At Lausanne, during the past week, German representatives have stated and reiterated that reparation payments as such are definitely ended. This is merely to confirm what close observers have believed for several months.

It probably represents progress to have the Germans adopt this absolute position, because it strips away a certain amount of solemn bluff which surrounded the Dawes and Young conferences and which has introduced hypocrisy into every international discussion of the problem. Reparations are finished. That is that. We have one fact to work from.

But this does not mean that the great world economic problems, of which reparations were but a symbol, have been solved. The question of Germany's status in Europe has not been settled. The question of discrimination under the Treaty of Versailles has not been settled. The question of territorial boundaries has not been settled. The question of war debts has not been settled.

The war debts question in particular cannot be settled without the collaboration of the United States. But both great political parties in their convention platforms have deliberately adopted planks squarely opposed to cancellation of war debts. The cancellation avenue of approach is cut off.

Nor is it very convincing to be told that "after the elections" the American attitude can be shifted. Apparently many European observers are taking this interpretation. "After the elections" is also seized upon by many economists and financiers as a kind of slogan. It is assumed that then the officials can go ahead on lines pointing definitely toward cancellation, even though they have just been put into office on a stiff anti-cancellation program. Is it not a false hope? Is it not a vain interpretation of the forces at work?

The people at large in this country have given no hint that now or later they will favor acceptance of the cancellation formula, either as the Europeans present it or as the New York experts present it.

The people feel that something is being put over on them whenever cancellation is proposed. In this respect they are not without some justification. European countries have an axe to grind that is so obviously selfish that the American people are skeptical. New York finance has so obvious a bias in the case that the public does not take its viewpoint as impartial.

No authorities have yet come along with a program which calls for mutual sacrifice on the side of all parties to the war debts. As long as this is the case, I, for one, cannot blame the American people for refusing to go along with schemes which mean shifting enormous burdens of taxation to the American taxpayer.

Ottawa—Money Standards in the British Empire

The Ottawa conference remains shrouded in considerable mystery, but it apparently will concern itself with an attempt to shift the monetary systems of Canada and of some other countries to a sterling base, and with an attempt to negotiate reciprocal trade advantages.

In a fundamental sense, the Ottawa conference is a preliminary monetary conference. Its results will indicate how widespread the sterling base is to become, and to what extent the British Empire is to set its face against further deflation.

Not until the terms and conditions of the sterling standard are known can very much be decided about the future relation of sterling to gold. Clearly England desires to make sterling again a gold unit, but only on terms which promise sufficient cooperation from the outside world to avert a repetition of the collapse of the autumn of 1931.

London—The Monetary Problem of the World

At the present moment it seems likely that a monetary conference will be held in London later this year and that general economic questions will be excluded from the agenda. The program for such a conference is exceedingly vague and uncertain. Doubtless one point to be pressed before the conference will be the rehabilitation of silver. Perhaps another will be the conditions of cooperation between central banks in the future. Perhaps an-

(*Concluded on page* 47)

... OBITUARY ...

DR. GEORGE K. BURGESS, director of the United States Bureau of Standards died in Washington from a cerebral hemorrhage on July 2. A world figure in the field of science, Dr. Burgess was stricken while discussing the economy bill with members of his staff. He died while being rushed in an ambulance to Emergency Hospital. Dr. Burgess was 58 years of age. He had suffered a lighter attack of the same kind Oct. 28, 1931.

Born in Newton, Mass., in 1874, Dr. Burgess was graduated from Massachusetts Institute of Technology in 1896. After receiving his doctor's degree at the Sorbonne, in Paris, he became associated with the Bureau of Standards in 1903 as associate physicist in charge of pyrometry. From this work he developed the Division of Metallurgy, which was established in 1913, and built up a wide contact with the iron and steel and metalworking industries for which he did a vast amount of research. On April 21, 1923, he was appointed by President Harding as director of the bureau, succeeding the late Dr. S. W. Stratton, who resigned to accept the presidency of the Massachusetts Institute of Technology.

Dr. Burgess was a member of numerous technical and scientific organizations. He was chairman of the National Research Council and a member of the National Academy of Sciences and the Washington Academy of Sciences. Among the organizations to which he belonged were the Cosmos Club, the American Engineering Standards Association, of which he was a director; American Institute of Mining and Metallurgical Engineers, American Society for Steel Treating, of which he was a former president; American Institute of Metals, American Society for Testing Materials, of which he was a past president; National Screw Thread Commission, and the Federal Specifications Board, of which he was chairman. He was an honorary member of the American Foundrymen's Association. Dr. Burgess was the United States delegate to the World Engineering Congress in Tokio in 1929 and an honorary member of the Japanese Society of Mechanical Engineers. During the World War he served as a member of the international aircraft standards board, made up of representatives of the United States, Great Britain, Canada, France and Italy. Dr. Burgess did notable work in high-temperature measurements, and was the author of several works on physics, including "Recherches sur la Constante de Gravitation" and "Experimental Physics."

DR. G. K. BURGESS

He translated H. E. Le Chatelier's "The Measurement of High Temperatures."

Secretary of Commerce Lamont, in commenting on the death of Dr. Burgess, said his passing will be a very definite loss not only to the Department of Commerce but to the scientific profession of this country, with which he has long been connected.

"He was admittedly in the first ranks of metallurgists of the country and his work in this field during the war won him nation-wide recognition," Secretary Lamont declared.

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JOHN WALKER, one of the pioneer steel manufacturers of the Pittsburgh district and for many years an associate of the late Andrew Carnegie, died at his home in Pittsburgh on June 23, aged 88 years. Mr. Walker was born in Allegheny, Pa., now part of Pittsburgh, and entered the steel industry as a young man. In 1872 he helped to organize Wilson, Walker & Co., to purchase the lower mill of the Union Mills Co. in Pittsburgh, which later took over the business of Berry, Courtney & Wilson, manufacturers of bar iron, railroad forgings and plates. The organization was later taken over by Carnegie, Phipps & Co., and Mr. Walker served as chairman of the board until 1888, when he retired from active business. For many years he maintained an active interest in Pittsburgh iron, steel and coal developments as a director in a number of organizations.

HERMAN ISAY, vice-president, secretary and treasurer of the Allegheny Foundry Co., Pittsburgh, died suddenly in Hammond, Ind., on June 22, where he had gone for a visit with relatives. He was born in Germany 62 years ago, and established himself in Pittsburgh when he was 21 years of age. Mr. Isay had spent a part of his business life at Gary, Ind., but had maintained his active connection with the Allegheny company for the last seven years.

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JOHN R. POWERS, president, Powers Belting & Machinery Co., Racine, Wis., died June 17, aged 69 years. He was born in Racine and was identified with the machinery and supply business throughout his career.

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GEORGE E. RAMSEY, former Youngstown steel company engineer, who was working in Soviet Russia as a construction engineer, died this week, relatives were informed. He formerly worked as a roller for the Youngstown Sheet & Tube Co. and the old Republic Iron & Steel Co. Later he became superintendent of the Indiana Harbor plant of the Sheet & Tube company and was also superintendent in charge of the construction of the Ambridge, Pa., plant of the A. M. Byers Co., Pittsburgh. Mr. Ramsey went to Russia in February, 1931.

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LOUIS BADEN, former superintendent of the foundry of the Nile Tool Works, died suddenly in Cincinnati on June 21, aged 65 years.

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DAVID L. ROSS, one of the founders of the Ross Gear & Tool Co., Lafayette, Ind., died after an operation recently in a Chicago hospital. He had been president of the tool company and its subsidiaries, the Fairview Mfg. Co. and the Ross Machine Co. He was 80 years old.

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WILLIAM A. SLACK, president, Torchweld Equipment Co., Chicago, died after a short illness on June 21. He was born in Chicago 57 years ago and was educated in the public schools of that city. He started a successful sales career early in life and built up a wide acquaintance in the manufacturing and jobbing trade throughout the United States. His first position was with the American Importing Co., in which company he advanced to the position of sales manager. His next position was as sales manager of the American Tool Works. Later, at Los Angeles, he directed the sales force of the Oxygen & Gas Products Co. In 1917 he organized the Torchweld Equipment Co., of which he was secretary. A few years later he was

made president, the position which he held until the time of his death.

In the oxyacetylene industry, Mr. Slack was widely known. His interest in the progress of the industry was unflagging, with the result that he was constantly subjected to responsibilities in association work as an executive and as a member of many committees.

He was a member and director of the American Welding Society and one of the founders and directors of the Chicago section of that society, past-president and director of the International Acetylene Association and a member of the Compressed Gas Association.

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HARRY F. OBERHELMAN, president, Eastern Machinery Co., Cincinnati, died on June 15.

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JAMES BARRETT for 40 years with the New York sales staff of the Worthington Pump & Machinery Corpn., Harrison, N. J., died after a short illness in New York on June 22. He was 66 years old.

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ROBERT B. WILLIAMSON, engineer in charge of alternating current design for the Allis-Chalmers Mfg Co., Milwaukee, died June 26 after a long illness. He was born at Smith's Falls, Canada, in 1873 and was graduated from Cornell University in 1893. He became identified with the Allis-Chalmers Co. in 1905, after having served several years as instructor in electrical engineering at Lehigh University. Mr. Williamson was a fellow of the American Institute of Electrical Engineers and widely known as an author as well as an engineer.

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IRA OWEN JONES, assistant general superintendent of the Wisconsin Steel Co., died on June 27, aged 49 years. He had been connected with the International Harvester Co. and its affiliates since 1906, when he was graduated from Cornell University.

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ROY C. BLANCHARD, production engineer of the grinding machine division of the Norton Co., Worcester, Mass., died after an operation on June 29, aged 40 years. A graduate of Worcester Polytechnic Institute, he had been with the company for 16 years.

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JOHN S. MCCORMICK, president of the J. S. McCormick Co., Pittsburgh, dealer in foundry supplies, was killed in an automobile accident near that city on June 25. He was 67 years of age and had been prominently identified with the foundry industry in the Pittsburgh district for more than 40 years. A founder of the Pittsburgh Foundrymen's Association, he had served on its executive committee for many years. Mr. McCormick was a director in the National Union Fire Insurance Co., Pittsburgh, and was also actively engaged in civic and philanthropic affairs in the community.

... PERSONALS ...

F. H. CROCKARD

FRANK HEARNE CROCKARD, president of the Woodward Iron Co., Woodward, Ala., for nearly 14 years, will retire from that position Aug. 1. The presidency will be assumed by A. H. Woodward, chairman of the board, who will also continue in the latter capacity. Mr. Crockard will retain his connection with the Woodward company as consulting engineer. Mr. Crockard has long been a leading figure in the iron and steel industry. His first responsible position in the industry was as assistant manager and later manager of the Riverside Works of the National Tube Co. at Wheeling, W. Va., his birthplace. He was elected vice-president and general manager of the Tennessee Coal, Iron & Railroad Co. in 1906, when John A. Topping, chairman of the syndicate which that year obtained control of the Republic and Tennessee companies, placed him in general charge of new construction of the latter company at Birmingham. Under that regime the Ensley duplex open-hearth plant was built and the program included also the reconstruction of the Ensley blast furnaces and the building of a blooming mill and rail mill. Mining developments in ore and coal are carried on at the same time on an extensive scale. On the acquisition of the Tennessee company by the United States Steel Corpn. late in 1907, Mr. Crockard continued his work as vice-president in charge of operations until July 1, 1917. Extensions and betterments in the interval involved expenditures exceeding $30,000,000. During that time also the sociological and other betterment work of the Tennessee company became widely known and Mr. Crockard had much to do with that program. From the Tennessee company Mr. Crockard went to the Nova Scotia Steel & Coal Co., New Glasgow, Nova Scotia, as president. In 1918 he returned to the Birmingham district to assume the presidency of the Woodward Iron Co. His work with the Woodward company was distinguished by his capacity as an engineer and his interest in the welfare of employees. Schools for both white and colored children were raised to a high standard of excellence and the living conditions of workers were measurably improved.

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H. K. CLARK, heretofore Chicago district manager of the grinding wheel division of the Norton Co., has been appointed director of sales of that division, with headquarters in Worcester, Mass. Except for a two-year period as sales manager of the Norton plant in Germany, Mr. Clark has been identified with the Chicago office for many years. He is being succeeded in Chicago by W. E. SHUMWAY, grinding wheel district manager of the Hartford, Conn., office. WILLIAM PETTIGREW, who has been a member of the Norton research laboratories and specialized on abrasive developments, has been appointed sales engineer of the abrasive grain division.

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THOMAS W. WILBOR, formerly associated with the hot and cold strip division of the Stanley Works, New Britain, Conn., and more recently with the New York office of that company, has joined the sales force of William H. Leonori & Co., Inc., New York representatives of the Griffin Mfg. Co., Erie, Pa.

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E. R. WEGENER, for the past four and a half years president and general manager of the Detroit Forging Co., Detroit, has resigned.

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T. E. COCKER has been appointed Buffalo District manager, with offices at 85 High Park Boulevard, for the Dings Magnetic Separator Co., Milwaukee.

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TAYLOR H. BEECH, formerly identified in a sales capacity with the Carpenter Steel Co. and the Midvale Co., has been made Pittsburgh district sales representative for the National Drawn Steel Co., East Liverpool, Ohio.

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A. W. THOMPSON, vice-president in charge of manufacturing, Fairbanks, Morse & Co., Beloit, Wis., resigned July 1. He has not announced his plans for the future. His successor is ALAN E. ASHCRAFT. Mr. Thomp-

son became associated with the company in 1920 after six years with the General Electric Co. at Indianapolis. Mr. Ashcraft joined the company in 1903, following his graduation from Cornell University. Since 1917 he has been in charge of the scale division at St. Johnsbury, Vt. In his new position he will make his headquarters in Beloit.

David G. Kerr, who retires on Aug. 1 as vice-president of the United States Steel Corpn., as announced in these columns last week.

HORACE B. GARDNER, who has been identified for the past 29 years with the order and stores department of the River Works, West Lynn, Mass., of the General Electric Co., was pensioned on June 24. He has been assistant supervisor for the past 10 years.

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A. R. KELSO has been appointed vice-president and general manager of the Detroit Forging Co., Detroit. Mr. Kelso has been for the past six years works manager of the Muskegon plant of the Continental Motor Co., and for four years prior to that was master mechanic of the Hudson Motor Car Co.

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DR. JOSEPH SLEPIAN, consulting research engineer for the Westinghouse Electric & Mfg. Co., East Pittsburgh, has been awarded the John Scott medal "for discoveries in the field of deionization of gases and fundamental and outstanding inventions involving these discoveries." The award was made by the board of directors of City Trusts in Philadelphia, assisted by an advisory committee composed of SAMUEL M. VAUCLAIN, chairman of the board of the Baldwin Locomotive Works; SOLOMON M. SWAAB, consulting engineer, and HERBERT T. HERR, vice-president of the Westinghouse company.

DONALD W. BRIDGEMAN, for a number of years associated with the sales department of the Foster Machine Co., Springfield, Mass., has been made treasurer to succeed EDWARD T. FOWLER, who has resigned.

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E. F. SELLS has been made manager of the Washington office of the Westinghouse Electric & Mfg. Co., East Pittsburgh, succeeding the late B. H. Hamilton. Mr. Sells has been identified with the company since 1911, having served in the Denver and El Paso, Tex., offices of the company prior to his removal to Washington in 1919.

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R. A. DAVIDSON, formerly identified with the Lincoln Electric Co., Cleveland, has been appointed general manager of sales of the Hollup Corpn., Chicago, maker of welding wire and equipment.

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R. E. LANKFORD has been made works manager of the J. A. Fay & Egan Co., Cincinnati. He will have complete supervision of the design, engineering and manufacturing of that company's new line of woodworking machinery.

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H. M. OLSON, formerly district sales manager of the Permutit Co., Pittsburgh, has become special representative in Pittsburgh for the Ohio Salt Co.

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FREDERICK H. CLAUSEN, president, Van Brunt Mfg. Co., Horicon, Wis., has been elected president, board of regents, University of Wisconsin. The election took place on the thirty-fifth anniversary of his graduation from the University. Mr. Clausen has been a member of the board for many years.

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E. E. RUSSELL, J. I. Case Co., Racine, Wis., has been elected president, Milwaukee chapter, National Association of Purchasing Agents. Other new officers include: SAM WILSON, Kearney & Trecker Corpn., Milwaukee, vice-president; E. O. JONES, Belle City Malleable Co., Racine, secretary; G. L. HARTMAN, Oilgear Co., Milwaukee, national director; H. A. FRANK, Sterling Wheelbarrow Co., Milwaukee, local director.

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DR. HOWARD MONROE RAYMOND has resigned as president of the Armour Institute of Technology. He became ill in February and has not been active since then. His resignation terminates 37 years of association with Armour Institute. He was graduated from the University of Michigan in 1893 and went to Armour Institute several years later as instructor in physics. In 1903 he was made dean of engineering and, on the death of Dr. Frank Gunsaulus, was elected president. The trustees have honored him with the position of president emeritus.

New Specifications for Gray Iron Castings

As a result of several years' research work by the Gray Iron Institute, Cleveland, the old specifications for gray iron castings were revised at the meeting of the American Society for Testing Materials held recently at Atlantic City and a new tentative standard was announced. There are two new features in these tentative specifications which are of interest to producers and users of gray iron castings.

Gray iron has been classified in seven groups according to tensile strength, these being 20,000, 25,000, 30,000, 35,000, 40,000, 50,000 and 60,000 lb. per sq. in. Tensile and transverse bar sizes for standard testing have been increased from one to three, these being 0.875 in., 1.2 in. and 2 in. in diameter, in order to provide adequate design information pertaining to various sections in castings.

Under the revised specifications, foundrymen will be able to state specifically the strength which may be expected in critical sections of their castings. Heretofore the single arbitration test bar has not given results which could be applied satisfactorily throughout the whole range of section sizes.

The institute has made about 1200 tests on bars varying from $\frac{3}{8}$ in. to 2.2 in. in diameter and has a mass of data available which will be of assistance to engineers or foundrymen interested in applying information concerning physical properties of gray iron to structural castings.

A certification plan is being worked out whereby a foundry submitting its iron to suitable tests and metallurgical inspection of these results can certify that its product fulfills the requirements under any one of the tensile test groups. It is expected that the adoption of the plan will result in the orderly marketing of gray iron castings.

Follansbee Breaks With Amalgamated Union

Conflict between the Follansbee Brothers Co. and the Amalgamated Association of Iron, Sheet and Tinplate Workers was brought to a climax July 1 when the company closed its Follansbee, W. Va., and Toronto, Ohio, mills and announced no further dealings would be had with the labor organization.

Aluminum match plates, guaranteed to be free from shifts, fins, shrinks or swells, are being produced by the Di-Mold Castings Co., Dayton, Ohio. They are made from plastic molds and cast under pressure.

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OFF THE ASSEMBLY LINE

Interest at Detroit Centers in Plans for New Cars

DETROIT, July 5.

PLANS for new models are taking precedence over current production activities as a subject of interest at Detroit. Automobile makers are well aware of the fact that the low-price market is their only hope in the months immediately ahead; consequently new offerings are likely to be largely in that class. However, presentations in most cases will be delayed until fall, the chief exception being the entry of Hudson-Essex, which is expected during the next 30 days. Since Wilson Foundry & Machine Co., at Pontiac, has disclosed its plans for manufacturing a substantial volume of motors during August, it seems probable that John N. Willys is counting on a new small car to be shown in September as the initial campaign in his program for a Willys-Overland comeback. What General Motors and Chrysler will do in the small car field still is a matter of speculation, and the likelihood is that they do not know themselves.

Thus the last half of the year, especially the last four months, should see the fight for the light car business intensified to the highest degree in the industry's history. There are two schools of thought regarding the course which should be taken by automobile builders. One is of the opinion that little will be gained by going to the expense of introducing new models before the year-end. Retail sales will be stimulated only slightly and employment will suffer in the winter months because dealers will have been stocked by the time severe weather comes and production consequently will be tapering. The other school believes it essential for factories to push forward the announcement dates of new models in order to hold together their already weakened dealer organizations and give them something they can sell to meet the requirements of buyers' lean purses. Just now many manufacturers are wavering, not knowing which plan to follow. Meanwhile, engineering developments are being carried out feverishly so that cars can be put on the market quickly if prospects look promising.

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June automobile production estimated at 175,000 cars.

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Last half of year will bring intensification of competition in light car field.

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Ford output in June 95,591 cars, with July schedule probably about 85,000.

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Ford Orders More Steel

Ford's steel specifications the past week were fair in volume and in some cases called for deliveries within seven days. Ford's main suppliers continue to operate on good schedules, with body builders having been the recipients of heavier releases. Ford is shipping as much material as possible from Rouge to branch assembly plants by water in Ford-owned boats. For some weeks Ford has been running six open-hearth steel furnaces. Some steel mill departments are operating alternate weeks. Assemblies of Ford cars in July probably will be in about the same volume as in June, but motor production probably will drop off to about 85,000 units. Employment at Rouge is still being maintained in excess of 80,000 on a basis of five days a week, with some departments working six days.

Chevrolet's June output is now put at 36,000 cars, with sales somewhat larger, probably over 40,000 units. Its plants are now closed for two weeks and its July production will not be over 25,000 cars. The report that its Saginaw foundry is making the first 3000 motor blocks for a new light car is not taken seriously in Detroit. Plans for a car of this type apparently have been shelved, at least for the present. Plymouth's assemblies this month ought to be fairly good, judging by releases to parts makers.

Pig iron shipments to the automobile trade in June were approximately of the same volume as in May. It is reported that the Chevrolet foundry at Saginaw still has in stock pig iron laid down on its docks last fall, its reduced schedules this year compared with anticipated requirements having made it unnecessary to take any fresh tonnage since the Lake season opened. However, it will have to replenish its stocks for next winter and spring. The Dodge foundry is drawing in from the outside heavy castings which fit into its production plan. The Oakland foundry at Pontiac is idle, having completed its run of small castings for the current Pontiac car. It is said that this foundry's future program is not yet known, although it may make light castings for other divisions of General Motors as well as for the Pontiac division, while the heavy castings will continue to be manufactured at Saginaw.

It will be recalled that there was considerable experimental work done by the Ford company and by a foundry in western Michigan in casting crankshafts and camshafts instead of forging them. Efforts in that direction were not entirely successful and have temporarily been abandoned.

June Output About 195,000

It is estimated that June production for the industry was 175,000 cars, compared with 193,000 in May. July will show a considerable decline. Steel companies are obtaining little satisfaction from the outlook for automobile tonnage in the next 60 days.

Completing the demise of the Oakland car, General Motors has discarded the name Oakland Motor Car Co. in favor of the name Pontiac Motor Co. for its manufacturing division at Pontiac, where the Pontiac car is made.

• • EDITORIAL

Loose Thinking About Overcapacity

STRAIGHT thinking is a prerequisite to sound economic planning. And straight thinking requires the application of the cold and unbiased question mark to many common beliefs. Nothing must be taken for granted.

The question mark has been applied to the theory of excess capacity as a depression cause by the National Industrial Conference Board, in its bulletin of June 20, 1932, under the heading, "Capacity and Performance in Manufacturing Industry."

Two types of excess capacity are recognized in this study. The first is termed "excess of economic capacity" and is obvious when the normal demand, at its seasonal peak, does not require the full use of existing equipment. The second type, called "excess of technical capacity," would exist when the utmost use of existing equipment, during a period, would result in more goods than could be demanded during that period.

This distinction is necessary to an intelligent study of the subject for the reason that an excess of technical capacity is probably a necessary and permanent factor in the organization of society, while excess economic capacity is a temporary condition.

It is obvious that industry can never hope to operate all of its machinery and men 24 hours a day from day to day and from season to season. Single-shift operation of eight hours is normal in many industrial plants, even during good times. Yet a plant operating on one eight-hour shift is attaining but one-third of its technical capacity, making no allowances for breakdowns and absentees.

The technical capacity factor is also affected by the length of the working day. Technical capacity excess, in the single-shift eight-hour day plant, would be decreased one-sixth by increasing the working day to 12 hours, provided no discount for fatigue were made.

Excess technical capacity existed before the depression and probably since the beginning of the machine age. As the bulletin states, "It appears to be an unavoidable concomitant of industrial society and one that tends to grow as equipment becomes more complex and costly."

Economic capacity normals cannot be defined with the rigidity with which technical capacity totals can be calculated. Length of working day, seasonal characteristics of demand, storage capacity, population growth, obsolescence of products, style changes, industrial environment and custom and other effective but elusive factors make it almost impossible to define normal economic capacity over a period, and hence to claim economic overcapacity.

M. C. Rorty is quoted as questioning the alleged over-expansion of productive equipment in 1928 and 1929. He believes that systematic overbuilding rarely, if ever, exceeds 10 per cent, which is counterbalanced by depreciation. "Two years of accumulated obsolescence," says Colonel Rorty, "should far exceed the over-equipment and would indicate that a restoration of normal business activity might require substantial expenditures for modernized factory equipment, even in many industries that were distinctly overbuilt at the end of 1929."

So far as economic excess capacity is concerned, it is extremely doubtful, concludes the bulletin, "that there was any general excess capacity when the usual conditions of manufacturing operation and the customary fluctuation of demand are considered."

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When Steel Emerges

IT is saying no new thing to remark that iron and steel demand fluctuates more violently than does business activity in general. A half century or so ago James M. Swank, for 40 years the historian and statistician of the industry, wrote in an annual report that iron seemed either to have a high fever or a severe chill. Later Andrew Carnegie coined the phrase that stuck: "Steel is either a prince or a pauper."

Now there is a general depression, and steel is especially depressed. Some men do not seem to realize that a part of the depression in steel is simply by the book, and hence they miss the obvious and certain deduction that when there is emergence from depression steel will have a greater emergence than business in general.

It is possible to measure this thing with sufficient closeness to support the deduction. Annual production of steel ingots may be divided by the Federal Reserve Board's index of industrial production, manufacturing and mining, and the quotients converted into a series of index numbers. The seven-year period of great activity, 1923 to 1929 inclusive, may be taken as a convenient base, 100. Within that period the index number ranged only from 90 in 1924 to 107 in 1929. In 1921, with severe depression, the number was down to 67, while for 1931 it stood at 72 and for the present it may be set at about 56.

This 56 or thereabouts is not the index of steel tonnage itself, but the index of steel tonnage relative to general industrial activity, comparing with nearly twice as large a number for 1929. Taking the median, in 1929 steel was 31 per cent better off than industry in general, while now it is 31 per cent worse off.

Thus in emergence or recovery steel has more ground lying before it to cover than has industry in general. It may not soon become a prince or experience a high fever, but it should be easy for it to get up to its average or ordinary relationship with business as a whole.

A long range study indicates clearly that up to and through the war steel was in one era and since then it

COMMENT • •

has been in another. In the first era steel increased more rapidly than industry in general, as had been the case with its predecessor, iron. During the period since the war steel, viewed in a broad way, has simply kept in step with general industrial activity. An index number of 107 for 1929 was mentioned above. For 1920 the corresponding index number was 109, while 1919 showed 95. At a ten-year interval the relationship between steel tonnage and general industrial activity did not swing materially. Steel may have lost the ability it had to grow more rapidly than other things, but there is no reason to doubt that in the long run it will be able to hold to the general pace. Steel is now especially slow and when industry quickens steel will have a double quickening to catch up with the procession.

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Loaning Motors for Emergencies

ONE of the large electrical manufacturers is making offers to lend to its customers general purpose electric motors to tide over a breakdown. The fact exhibits the extent to which a supplier will go to cement good will among its clients. All that is exacted is the payment of whatever charge may be necessary to replace the motor into stock. The receipt of the offer makes for a very favorable impression. In a time of light operations orders are commonly for immediate delivery and stoppage of manufacturing is to be avoided. That the borrowing of the motor may well result in an outright sale is recognized as a possibility.

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Smallness Has Its Advantages

EVIDENCE that small and moderate-sized companies are withstanding depressed business conditions somewhat better than larger units is offered by a survey made recently by Babson's Statistical Organization. From a questionnaire sent to 1500 carefully selected companies, with a capitalization of less than $500,000, it was indicated that concerns of this size have made considerable progress in their readjustment to 1932 conditions. About 500 replies to the questionnaire were received, and even though many companies reported a complete suspension of operations, their number was more than offset by those whose operating results this year show an improvement over the corresponding 1931 period.

As a result of the survey, the organization has concluded that small and medium-sized businesses have certain advantages over large concerns in periods of depression. They are able to make more rapid readjustments to depressed conditions. They are flexible enough to adapt products more quickly to changing demand. Close control of production makes possible a quick and thorough overhauling of operating costs. Profits are possible on a small volume of orders which will be unprofitable to a large unit because of burdensome overhead. The smaller company is generally not burdened with heavy debt charges. Smaller companies usually carry relatively light inventories, and can limit their losses when prices are declining drastically.

The steel producing industry is unfortunately not adaptable to small scale production. The relatively smaller units in the industry were generally the first to show deficits in 1930, and gradually declining volume has kept them in red ink up until the present time. The larger organizations were generally slow to reach unprofitable production levels, but their deficits have increased relatively more rapidly than the smaller units. It is also probably safe to predict that they will be slow to return to profitable levels as business activity increases. However, the example set by smaller concerns should be helpful to the larger companies in preparing for business recovery.

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Factory Farms

MORE than 50,000 employees of the Ford Motor Co. have planted thrift gardens this summer. Through the cooperation of Detroit sub-dividers of land, enough ground has been made available to give each workman who does not already have a home garden a plot 40 x 100 ft., which is ample to raise vegetables to supply the family table all summer with plenty to store for next winter.

The Ford company is using its tractors to plow furrows marking off the individual lots and each large tract of garden land will be guarded by a company watchman. *The Ford News*, Ford trade publication, issued a supplement giving the details needed to plant a garden, including a chart showing how it should be laid out to get the best results.

This step on the part of Ford company is indicative of what industry can do to help its employees through the present emergency. Ford is not unique in this enterprise of gardening, as many other metal-working companies, including some in the steel industry, have embarked on similar ventures. However, the large scale of the Ford program and the way in which it is organized to obtain the best results are suggestive of what can be accomplished by organized effort along similar lines by industry in general, as an emergency measure.

As a matter of long range economic policy, depriving the farmer of thousands of former industrial customers through the broad extension of this plan might seem like "robbing Peter to pay Paul." Against this aphorism, in times like these, however, might be placed the equally well known maxim, "Charity begins at home."

... LETTERS TO THE EDITOR ...

To Increase Purchasing Power and Reduce Capital Charges

Editor, The Iron Age:

Our depression is caused by too many having things to sell and not enough parties having cash with which to buy.

We understand that some company's stocks are listed on the open market for less price for all the stock than the actual cash in the treasury of these companies.

We suggest that these companies make a standing offer for all the stock which will be turned in to them for a certain price. The company, certainly, will not lose anything, whereas the selling public will have some money to use for other purposes which will tend toward recovery from the depression, provided enough companies adopt the plan.

There might be some question as to ownership of the company if the stock were all bought in in this way, but that could probably be worked out, because if the owners of the stock are glad to sell it at a certain price, they would not be interested in the final owners of the business.

Doubtless others have thought of this plan, but I have not seen anything in print, so make the suggestion.

W. S. DAVENPORT,
Pres. and Gen. Mgr.
Davenport Machine Tool Co.

Editor's Note: This plan has been suggested as applicable to railroads' use of R. F. C. loans. The principle could well be applied to sound industrials whose securities are at "bargain" levels.

Wanted—A Call to Arms

Editor, The Iron Age

WHEN last August the President appointed Walter E. Gifford to head up a nation-wide movement for communities to plan for the relief of the unemployed, THE IRON AGE expressed the hope that the opportunity would then be taken to arouse the nation to a high pitch of patriotic fervor to engage throughout the length and breadth of the land in the repair and the reconstruction of homes and factories. The need was abundant and the means were available through the release of credit and otherwise. With everyone imbued with the idea, a mass movement was certain, with simultaneous expenditures on millions of projects and a unity of purpose akin to the war spirit of saving the country from dire plight. Even some of the insatiable deflationists might have succumbed.

But the kindling of the fire never occurred. Instead things have gone from bad to worse until in the discussions in Congress emphasis lately has again been placed on the importance of encouraging private construction apart from public construction as a sane way of reviving industrial activity. The fact reminds the writer of an article in your paper last fall by Charles A. Carpenter, of Pittsburgh, (Sept. 10, 1931), who outlined the large volume of rehabilitation work that alone was warranted from the standpoint of safety, sanitation and comfort as well as of efficiency. The need he urged was a plan gigantic in scope, pushed by publicity and backed by national solidarity.

It now looks as though such a plan, if any there should be, would have to be self-evolving. No occasion or situation in the offing promises any such help as suggested to speed up the slow-working forces of our economic machinery. If the concentration in the next several months on the fall elections should be broken by any stimulating message from Mars, it would be surprising. Yet, of course, we may be hopeful.

M. W. W.

It Takes Two to Make a Bargain

Editor, The Iron Age:

The letter in the May 5 issue of THE IRON AGE under the heading "It Takes Two to Make a Bargain" is just what the spineless sellers should read and heed.

Every seller has the right to refuse to sell goods below cost and every seller must do it before our business will be restored.

Who does not know by this time that this price cutting has become a vicious circle and kills rather than creates business.

Why not adopt a slogan: NO SALES WITHOUT PROFIT.

Buy a rubber stamp and use it on every letter sent out.

If one does not want it on his letters, let him wear it in his heart, on the end of his tongue and in the first line of his "business policy."

Some will violate the command, of course, just as some violate the laws of the land, but law breakers do not get far nor do they lead the world.

The Dog Eat Dog policy has been in use so long every one is barking. If we are going to continue to bark at the moon and say "It can't be done," we may as well say:

"MOVE OVER, CHINA, AMERICA HAS TOUCHED BOTTOM AND IS COMING RIGHT THROUGH, FOR WE ARE NOW THE YELLOW RACE."

HERBERT G. HIGGINS

Canadian Experience With the Sales Tax

Editor, The Iron Age:

As a careful reader of your paper, may I be permitted to suggest that if United States manufacturers allow themselves to be put under the burden of a sales tax they will soon find it intolerable. We have had 10 years' experience in Canada. What was proposed as an emergency tax of 1 per cent rose to be a confiscatory tax of 6 per cent. This was being reduced, and up to two years ago we hoped it would be abolished, but the emergency of the present depression put it up to 4 per cent and eventually to 6 per cent, where it is now. Does anyone suppose that any business has a margin of 6 per cent on sales? The only answer is "Pass it along—add it to your prices." But it is much easier said than done. After 10 years the sales tax system is so honeycombed with complications and exemptions and rulings that the Canadian Manufacturers' Association has just published a book of 140 pages, nearly as big as THE IRON AGE, trying to explain it. This is merely a reference book. It is eloquent comment on what was advocated as a simple tax, that no one would feel. It must be remembered that manufacturers not only have to find the money, but must carry on a system of special accounting to compute the tax.

Some of the complications are that the same goods that are subject to tax for some purposes are exempt for others; and that certain classes of buyers are exempt. It requires constant supervision of the billing, and after that some one who is competent and trustworthy must examine each charge, and make up the tax returns for the Collector of National Revenues. The only people who approve of a sales tax are bankers and lawyers, who do not have to pay it.

By way of comment let me refer to the statement of Richard Whitney, president of the New York Stock Exchange, before the Committee of Finance of the United States Senate. He was discussing the taxation of stock transfers, and he says on page 5: "I approve a general manufacturers sales tax"—but he goes on to show the inequity of a transfer tax, which might, in some cases, amount to ¼ of 1 per cent. What would he think of a tax of 4 per cent or 6 per cent—not on the realized value of a cash transaction, but on the selling price of goods which are not paid for—pe.-

haps sold on three months' credit! It all goes to show that a sales tax looks easy to the man who does not pay it. Perhaps our friends, the United States manufacturers, are wiser than they know in refusing to submit to any such form of taxation.

WILLIAM Q. PHILLIPS

Economy of Present Day Engineering and Planning

Editor, The Iron Age:

IT is common knowledge that the market for new products, keener competition and new processes of manufacturing will require the remodeling or replacement of plants and processes which are obsolete. Expansion of plants and new plants will also be required.

In the event of a quickly rising market, which seems to be more of a probability than just a possibility, the plans for these projects will be rushed through under a pressure of time. Time will be the essence of every contract as the saying goes. The plans and ideas will be executed by a personnel which has been selected hastily and with less discretion than when more time is permitted for obtaining the best talent available. Getting together an organization for a project of any size and obtaining the complete coordination of the sections thereof is a very difficult task. Consideration as to the execution of the project is considerably curtailed. Lack of foresight prevails. The flexibility of the project for future requirements is greatly endangered.

The cost of engineering work is very seldom a big factor and may be offset very often by careful consideration and investigation through better processes obtained or a more efficient execution.

Now my point is this:

Why can't the organizations which have these projects in mind for maturity in better times, execute the plans for them at this time?

Couldn't the cost of this work be taken care of by loans?

Couldn't this expenditure be carried in a suspended account to be absorbed by the cost of the project when it matures?

The only additional cost is that of the interest and fees for the loans. And what is that compared to the cost of some errors?

Why wait for another war or something else to happen?

Let's go.

WALTER NEILSON

Editor's Note: Many companies in the metal-working field have already taken advantage of the times to prepare plans for future business. In all probability, the first signs of an upturn will disclose an unprecedented number of new products and new equipment designs. Most of this work, however, has been financed from surplus. There is a question as to the feasibility of obtaining loans for research, development or experimental purposes when it is difficult to obtain them even for financing actual orders, without excessive collateral.

A Time to Examine Wastes in Education

Editor, The Iron Age:

The last sentence of your editorial comment entitled "Industry and the Graduate," reading:

"If we mistake not, the years just ahead will prove just as trying for colleges as to industry in the changes they will demand in methods and aims, and most of all in the quantity and quality of the product."

contains a pregnant hint to educationalists. For example, Prof. Philip Cabot, of the Harvard Graduate School of Business Administration, enthusiastically endorses Prof. Adelbert Ames, of the Dartmouth Medical School, who, in a paper entitled "Progress and Prosperity," published in the *Dartmouth Alumni Magazine*, classifies education as one of the "human activities which cannot be overproduced." Most industrialists have learned, however, that anything can be over-produced in the sense that it may be produced at the expense of other things that are more desirable. The contention that education is not subject to over-production will lead a class of politicians to the conclusion that more taxes should be levied to build more buildings, provide more equipment and pay more or larger salaries to educators. In fact, Professor Ames suggests that in order to divert labor into "non-consumable activities," among which he includes education, more capital should be put into use by taxation, as well as by exempting gifts to educational institutions from income and gift taxes. He states that "It would seem that the most conclusive argument on this question is to be found in the expenditures during the last fifty years in some of our larger cities. . . . The amounts expended increased rapidly year by year, the municipalities going deeper and deeper into debt. From a strictly economic point of view general ruin was inevitable. But what has been the result? The increase in non-consumable values has been such that the paper of these so considered spendthrift municipalities is at present one of the most economically sound investments that exist."

Professor Cabot asks: "But where shall we get the money to pay for these new things?" and replies "The answer is simple. Just where we got the money for the things we now have." Apparently he has taxation in mind, for he proceeds: "The capital must come in the first instance out of profits earned in other fields and may be derived either from voluntary investments of private capital, like the endowment of universities, research foundations and art museums, and the purchase of works of art, or from taxation for public education, parks, museums, etc." Further: "If we saw the rate of taxation as a measure of civilization, our views might change." His views are also indorsed by Dean William R. Gray, of the Amos Tuck School of Administration and Finance, Dartmouth College. The Gray, Cabot and Ames papers, in fact, abound in ingenious and mystifying speculation designed to justify robbing the individual taxpayer, which includes all producers, of his choice of what he may have in return for his efforts and savings.

Emphatically, before educationalists ask for more money for schools, which may exclude other and possibly more desirable activities, they should look into some of the vast wastes of education as it is actually conducted, such as:

Education in paper work instead of in doing things.

Education of memory in subjects of doubtful value.

Education which is little more than partisan propaganda.

Education which fails to meet the needs of, or creates a distaste for, activities involving physical labor, as for example that which results in an over-supply of the white collar and professional classes at the expense of equally well paid skilled workers.

Education which wastes valuable formative years and emasculates the will to take responsibilities.

Education which fosters academic loafers.

Education which entails sterility and extinction of the more capable strains—compare the statistics of reproduction of graduates of leading universities and colleges.

Should not education in the long run be expected to pull its own weight and not to become merely an institution for imposing burdens upon some to contribute to the leisure and pleasure of others?

GEORGE H. GIBSON

A 4-page bulletin giving physical and chemical data on corrosion-resisting alloy steels has been issued by the Duriron Co., Inc., Dayton, Ohio. A table of resistance to various chemicals for Durimet, KA2S, and KA2SMo, is included, which is intended simply as a guide and not a conclusive recommendation. There are also notes on machining, heat treating and welding and information with illustrations on the grinding of drills and lathe tools. The bulletin, No. 171, is available upon request.

June Daily Production of Pig Iron Off 17 Per Cent

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PRODUCTION of coke pig iron in June was 628,064 gross tons, compared with the May production of 783,554. The loss in the daily output of June from May was a little over 17 per cent, or from 25,276 gross tons in May to 20,935 tons in June.

There were 46 furnaces in operation on July 1, making iron at the rate of 18,955 tons daily, compared with 53 furnaces in blast on June 1, with a daily operating rate of 22,965 tons. The net loss in the number of furnaces operating on July 1 was seven. Of these, five were banked, two of them at the end of the month and over the holiday. These will most likely be started up in the near future.

Eight furnaces were blown out or banked during June and one was blown in. Of the furnaces taken off, six belong to independent steel companies, one was a Steel Corporation furnace and one was a merchant furnace. The furnace blown in is a merchant unit.

The following companies each took off one furnace: Bethlehem Steel Co., a Lackawanna furnace; Youngstown Sheet & Tube Co., a Campbell furnace; Republic Steel Corpn., Betty furnace; Wheeling Steel Corpn., Portsmouth furnace; National Steel Corpn., Zug furnace; Colorado Fuel & Iron Co., one furnace. The National Tube Co. banked one in its Ohio group, and the Davison Coal & Coke Co. banked its Neville Island furnace. The only furnace that was put in blast was that of the Jackson Iron & Steel Co.

Production of Coke Pig Iron and Ferromanganese

Gross Tons

	Pig Iron*		Ferromanganese†	
	1931	1932	1931	1932
January	1,714,266	972,784	14,251	11,250
February	1,706,621	964,280	19,480	4,010
March	2,032,248	967,235	27,899	4,900
April	2,019,529	852,897	25,456	481
May	1,994,082	783,554	23,959	5,219
June	1,638,627	628,064	11,243	7,702
½ year	11,105,373	5,168,814	122,288	33,562
July	1,463,220	.....	17,776	.....
August	1,280,526	.....	12,482	.....
September	1,168,915	.....	14,393	.....
October	1,173,283	.....	14,739	.....
November	1,103,472	.....	14,705	.....
December	980,376	.....	15,732	.....
Year	18,275,165	.....	212,115	.....

*These totals do not include charcoal pig iron. The 1931 production of this iron was 46,213 gross tons.
†Included in pig iron figures.

Production by Districts and Coke Furnaces in Blast

Furnaces	Production (Gross Tons) June (30 Days)	Production (Gross Tons) May (31 Days)	July 1 Number in Blast	July 1 Operating Rate, Tons a Day	June 1 Number in Blast	June 1 Operating Rate, Tons a Day
New York:						
Buffalo	39,827	63,233	3	1,280	4	1,920
Other New York and Mass.	.....	.....	0	.....	0	.....
New Jersey	.....	.....	0	.....	0	.....
Pennsylvania:						
Lehigh Valley*	16,724	20,851	2	560	2	675
Schuylkill Valley	.....	.....	0	.....	0	.....
Susquehanna and Lebanon Valleys	10,641	11,004	1	355	1	355
Ferromanganese	.....	.....	0	.....	0	.....
Pittsburgh District	86,876	113,972	6	2,780	7	3,100
Ferro. and Spiegel.	3,952	4,163	1	135	1	135
Shenango Valley	10,381	13,036	1	350	1	420
Western Pennsylvania	11,481	15,928	1	385	1	515
Ferro. and Spiegel.	.....	.....	0	.....	0	.....
Maryland	25,767	28,528	2	860	2	920
Wheeling District	82,370	77,142	4	2,745	4	2,490
Ohio:						
Mahoning Valley	44,583	58,705	2	980	3	1,505
Central and Northern	58,546	70,262	4	1,225	6	2,335
Southern	13,053	16,492	2	405	2	530
Illinois and Indiana	152,108	162,669	11	5,070	11	5,250
Mich., Wis. and Minn.	22,821	24,613	1	320	2	795
Colo., Mo. and Utah	12,255†	19,008†	1	280	2	615
Virginia	.....	.....	0	.....	0	.....
Kentucky	.....	7,030	0	.....	0	.....
Alabama	36,679	76,918*	4	1,225	4*	1,405
Ferromanganese	.....	.....	0	.....	0	.....
Tennessee	.....	.....	0	.....	0	.....
Total	628,064	783,554	46	18,955	53	22,965

*Includes spiegeleisen.
†Includes ferromanganese.

Daily Average Production of Coke Pig Iron

Gross Tons

	1930	1931	1932
January	91,209	55,299	31,380
February	101,390	60,950	33,251
March	104,715	65,556	31,201
April	106,062	67,317	28,430
May	104,283	64,325	25,276
June	97,804	54,621	20,935
½ year	100,891	61,356	28,412
July	85,146	47,201	.....
August	81,417	41,308	.....
September	75,890	38,964	.....
October	69,831	37,848	.....
November	62,237	36,782	.....
December	53,732	31,625	.....
Year	86,025	50,069	.....

Merchant Iron Made, Daily Rate

1931	*Tons*	1931	*Tons*
Jan.	9,416	Nov.	5,758
Feb.	11,332	Dec.	6,778
March	11,481		
April	13,439	1932	
May	13,212	Jan.	6,256
June	11,209	Feb.	7,251
July	12,012	March	7,157
Aug.	9,569	April	5,287
Sept.	8,985	May	4,658
Oct.	7,051	June	6,090

New Theories Presented at New Haven Meeting

About three hundred engineers met last week at Yale University, New Haven, Conn., for the second joint meeting on applied mechanics held by the American Physical Society and the American Society of Mechanical Engineers. Most of the papers were of a technical nature and the exhibit was entirely one of testing and laboratory equipment. At an interesting session on vibration Dr. M. Biop, professor at the California Institute of Technology, Pasadena, outlined a new theory in steel building construction which involves a flexible or vibration-dampening first floor. The first building under this new design is now under construction in San Francisco, said Dr. Biop.

During a technical symposium on strength of metals, Dr. F. Zwicky, professor, California Institute of Technology, said that research work had progressed so far in the direction of securing pure metal crystals that it was now evident that the pure crystal does not attain its theoretical strength. Heretofore the discrepancy between the actual and the theoretical strength of crystals was accounted for on the basis of impurities. Now with practically pure crystals to work with Dr. Zwicky feels that some other explanation must be offered.

SUMMARY OF THE WEEK'S BUSINESS

Steel Output Probably at Record Low; With Pig Iron at 1896 Level

Moderate Rebound From Present 12 Per Cent Rate Will Occur Next Week—Automobile Production Declines—Pennsylvania Takes 20,000 Tons of Rails

STEEL ingot output this week, at not more than 12 per cent of capacity, is probably the lowest on record. June output of pig iron, at 20,935 gross tons a day, was the smallest since December, 1896. Weakness in pig iron prices is reflected by a decline in THE IRON AGE composite to $13.76, a figure not equaled since August, 1915, and steel scrap has dropped to a new all-time low of $6.42. These developments make a stark picture of the extreme deflation that is occurring in the iron and steel industry.

A moderate rebound in steel and pig iron production is indicated for next week, when some plants that were shut down before the holiday will resume. There is, however, an almost complete lack of the constructive factors that are needed to lift steel output above its June average of about 18 per cent, and steel companies do not look for any marked change for the better during July and August.

Only in steel prices is there any of the stability that may be expected to mark the beginning of a recovery period, and even in this respect the situation is not without some irregularities.

THERE was a loss of slightly more than 17 per cent in the daily output of pig iron in June from that of May, the figure for last month being 20,935 gross tons against 25,276 tons. The June total was 628,064 tons, compared with 783,554 tons in May. In June, 1931, the aggregate was 1,638,627 tons, or 54,621 tons a day. In the first six months of this year 5,168,814 tons was produced, less than half of the 11,105,373 tons made during the corresponding period last year.

The decline in pig iron production has been continuous since April, 1931, with the exception of a moderate rise in February of this year. On July 1 only 46 blast furnaces were active, a decline of seven during June, but of these five are only banked and, if business warrants, will be making iron again soon. The Steel Corporation discontinued one furnace and independent companies took off six. One merchant furnace was blown out, but another went into service. The 46 furnaces in blast on July 1 were making iron at the rate of 18,955 tons a day, or almost 2000 tons a day below the June average output.

Many of the steel companies have closed down their open-hearth departments completely this week, while others are keeping only one or more furnaces in service to fill urgent orders. Although there was a slight spurt in specifications at the end of June against expiring second quarter contracts, particularly for flat-rolled products on which some low-priced coverage was outstanding, the tonnage was not sufficient to offset the general decline in bookings preceding the holiday. The shutting down of a considerable number of industrial plants for part or all of July is a decided factor in the reduction of steel orders.

Automobile production, which was expected to attain a peak in June, declined last month from the May total. Ford's world output of 95,591 cars brings the June total only to about 175,000 against about 193,000 in May. Ford production in July probably will not exceed 85,000, with not more than 70,000 indicated for August. The steel industry therefore does not expect motor car manufacture to be a greatly sustaining factor during the remainder of the summer.

Railroad buying is marked by only one sizable order, a release of 20,000 tons of rails on old contracts by the Pennsylvania Railroad, from which three mills benefit. Prices on finished steel quoted to the New York Central were in line with current published quotations except that Chicago mills offered bars, plates and shapes at 1.60c. a lb., f.o.b. A custom of about 25 years ago was revived by this road in asking that steel companies accept scrap in payment for finished steel, but there were only a few bidders and the highest tender was $6 a ton, delivered.

PRICE weakness in finished products is most marked in alloy steel bars and tin plate. Alloy bars have become available to a large number of buyers at 2.45c. a lb., base. On a recent inquiry for about 25,000 boxes of tin plate, sharp concessions from the official price were offered by several makers. In some districts competition for reinforcing bars has brought marked concessions on the billet steel product.

Tin plate production, which was averaging about 50 per cent before the holiday, is likely to taper off, there having been a definite check in releases by the can companies.

Although fabricated structural steel contracts in June were the largest for any month since last October, totaling 127,800 tons, according to THE IRON AGE compilation, the holiday brought a decline to only 6000 tons for the past week.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	July 5, 1932	June 28, 1932	June 7, 1932	July 7, 1931
Per Gross Ton:				
No. 2 fdy., Philadelphia	$14.34	$14.84	$14.84	$17.01
No. 2, Valley furnace	14.50	14.50	14.50	17.00
No. 2 Southern, Cin'ti	13.82	13.82	13.82	14.69
No. 2, Birmingham	11.00	11.00	11.00	12.00
No. 2 foundry, Chicago*	15.50	16.00	16.00	17.50
Basic, del'd eastern Pa.	15.50	16.00	16.00	16.75
Basic, Valley furnace	13.50	14.00	14.00	15.50
Valley Bessemer, del'd P'gh	16.89	16.89	16.89	18.76
Malleable, Chicago*	15.50	16.00	16.00	17.50
Malleable, Valley	14.50	15.00	15.00	17.00
L. S. charcoal, Chicago	23.17	23.17	23.17	25.94
Ferromanganese, seab'd carlots	68.00	68.00	68.00	85.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	32.00	32.00	32.00	34.00
Rerolling billets, Pittsburgh	26.00	26.00	27.00	29.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	29.00
Slabs, Pittsburgh	26.00	26.00	27.00	29.00
Forging billets, Pittsburgh	33.00	33.00	33.00	35.00
Wire rods, Pittsburgh	37.00	37.00	37.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.65

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.65
Bars, Chicago	1.70	1.70	1.70	1.70
Bars, Cleveland	1.65	1.65	1.65	1.65
Bars, New York	1.95	1.95	1.95	1.98
Tank plates, Pittsburgh	1.60	1.60	1.60	1.65
Tank plates, Chicago	1.70	1.70	1.70	1.70
Tank plates, New York	1.898	1.898	1.898	1.93
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.65
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	1.86775	1.86775	1.86775	1.90½
Cold-finished bars, Pittsburgh	1.70	1.70	1.70	2.10
Hot-rolled strips, Pittsburgh	1.45	1.45	1.40	1.55
Cold-rolled strips, Pittsburgh	2.00	2.00	2.00	2.15

Finished Steel

Per Lb. to Large Buyers:	July 5, 1932 Cents	June 28, 1932 Cents	June 7, 1932 Cents	July 7, 1931 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.20	2.20	2.20	2.40
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.30	2.30	2.30	2.50
Sheets, galv., No. 24, P'gh	2.85	2.85	2.85	2.90
Sheets, galv., No. 24, Chicago dist. mill	2.95	2.95	2.95	3.00
Hot-rolled sheets, No. 10, P'gh	1.55	1.55	1.55	1.70
Hot-rolled sheets, No. 10, Chicago dist. mill	1.65	1.65	1.65	1.80
Wire nails, Pittsburgh	1.95	1.95	1.95	1.80
Wire nails, Chicago dist. mill	2.00	2.00	2.00	1.85
Plain wire, Pittsburgh	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.25
Barbed wire, galv., Pittsburgh	2.60	2.60	2.60	2.55
Barbed wire, galv., Chicago dist. mill	2.65	2.65	2.65	2.60
Tin plate, 100-lb. box, P'gh	$4.75	$4.75	$4.75	$5.00

Old Material

Per Gross Ton:				
Heavy melting steel, P'gh	$8.25	$8.25	$9.00	$10.25
Heavy melting steel, Phila.	6.25	6.25	6.25	8.50
Heavy melting steel, Chicago	4.75	5.25	6.25	8.75
Carwheels, Chicago	5.50	5.50	6.25	10.00
Carwheels, Philadelphia	8.00	8.00	8.00	12.00
No. 1 cast, Pittsburgh	9.00	9.00	9.00	10.50
No. 1 cast, Philadelphia	8.00	8.00	8.00	11.50
No. 1 cast, Ch'go (net ton)	6.00	6.00	6.50	9.00
No. 1 RR. wrot., Phila.	8.50	8.50	8.50	10.00
No. 1 RR. wrot., Ch'go (net)	3.75	3.75	3.75	7.00

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$2.00	$2.00	$2.00	$2.40
Foundry coke, prompt	3.00	3.00	3.00	3.50

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	...	5.50	5.50	9.12½
Electrolytic copper, refinery	...	5.12½	5.12½	8.00
Tin (Straits), New York	...	19.12½	19.87½	26.00
Zinc, East St. Louis	...	2.75	2.82½	3.95
Zinc, New York	...	3.12	3.19½	4.30
Lead, St. Louis	...	2.90	2.90	4.22½
Lead, New York	...	3.00	3.00	4.40
Antimony (Asiatic), N. Y.	...	5.12½	5.12½	7.00

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
July 5, 1932	2.087c. a Lb.	$13.76 a Gross Ton	$6.42 a Gross Ton
One week ago	2.087c.	14.01	6.58
One month ago	2.087c.	14.01	7.17
One year ago	2.137c.	15.59	9.17
	Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1932	2.087c., Mar. 29	2.037c., Jan. 19	$14.81, Jan. 5	$13.76, July 5	$8.50, Jan. 12	$6.42, July 5
1931	2.142c., Jan. 13	2.052c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.362c., Jan. 7	2.121c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.412c., April 2	2.362c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.391c., Dec. 11	2.314c., Jan. 3	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.453c., Jan. 4	2.293c., Oct. 25	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22
1926	2.453c., Jan. 5	2.403c., May 18	21.54, Jan. 5	19.46, July 13	17.25, Jan. 5	14.00, June 1
1925	2.560c., Jan. 6	2.396c., Aug. 18	22.50, Jan. 13	18.96, July 7	20.83, Jan. 13	15.08, May 5

Ingot Production in Pittsburgh and Valleys Falls Below 10 Per Cent of Capacity

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PITTSBURGH, July 5.—The holiday week-end, coupled with political and economic developments, has made the past few days extremely quiet ones for the local steel industry. Suspended operations in most of the steel-consuming plants were immediately reflected in specifications for finished steel products, and shipments out of this district are almost at a standstill. In the meantime, new buying has been negligible and operations have declined almost to the vanishing point.

Activity in the structural steel market has held up fairly well, although new inquiry is coming out at a slower rate. One or two of the independent fabricators in the district have built up fair backlogs and are maintaining a good rate of operations. Others are closed down, and the leading interest is running at less than 50 per cent.

Tin plate specifications have also been temporarily checked, and current releases are not sufficient to maintain the 50 per cent operating rate which was in effect prior to the holiday. Steel shipments to the Ford Motor Co. are being maintained, but other automotive consumers are curtailing their needs.

Because many of the open-hearth plants in the district, which went down last week, have not yet resumed production, steel-making schedules in the district have fallen well under 10 per cent of capacity, with the prospect of a sharp rebound at the beginning of next week. However, some of the smaller plants which are now idle may resume production this week if orders for finished steel show much improvement. Mills have succeeded in adjusting production very closely to demand, and in this district stocks of ingots and semi-finished steel are insufficient to draw on for any length of time.

Valley production also has been sharply curtailed and averages no higher than Pittsburgh. Week-end interruptions in schedules brought down Wheeling district production to about 20 per cent.

Finishing mill activity does not differ greatly from ingot production, except in the case of tin plate and some finishes of sheets and strip steel.

Prices are generally unchanged, and lack of buying has brought no further test to doubtful quotations. The raw materials markets are very quiet, and the price tone is not strong.

Activity is fairly well maintained in structural steel, but tin plate output has been adversely affected by a decline in specifications.

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The flow of steel to Ford has not diminished, but other motor car makers are curtailing their needs.

* * *

Malleable pig iron in the Valleys has declined 50c. a ton to a parity with foundry iron.

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Pig Iron

Pig iron sales reflect no change, except possibly a lighter volume in the last few days. Foundries are buying in lots as small as 25 tons, and carloads make up the bulk of current transactions. Outside competition has forced the price of malleable iron in the Valleys to the same level as the foundry grade, following a period of about five years in which a 50c. premium has been obtained. Although not all local furnaces are meeting the $14.50, Valley, base on malleable, consumers in that territory are always able to develop this figure. Sales of Bessemer are still being made at $15, and the $14.50 price on foundry iron is well maintained. The same can be said of the Pittsburgh furnace price of $15 on foundry, malleable and Bessemer iron. Basic iron prices are strictly nominal, and reports of extremely low quotations on desirable tonnages are heard in both districts.

Semi-Finished Steel

Open market transactions are lacking in this market, but the price of billets, slabs and sheet bars is well maintained at $26, Pittsburgh. Forging billets are holding at $33, with some sales reported. Wire rods are quiet, but the $37, Pittsburgh, price is not questioned.

Rails and Track Supplies

Small miscellaneous purchases by a few of the carriers have been reported during the week, but third quarter requirements have generally been confined to an absolute minimum. The prospect of rail releases by the large Eastern carriers is rather vague, and additional purchases by the Pennsylvania seem to be entirely out of the question. The New York Central is still deferring action on its rail requirements.

Bolts, Nuts and Rivets

The new quarter is beginning with a somewhat better price structure than the industry has enjoyed for several months. Tonnage is very light, but bolt discounts are well maintained at 75 per cent off list. Large rivets are quoted at $2.25 a 100 lb., and small rivets at 70, 10 and 5 per cent off list.

Cold-Finished Steel Bars

The new base price of 1.70c., Pittsburgh, on lots of 10,000 lb. or more for shipment at the same time to the same destination is now in effect, and some tonnage is moving on this basis. The new price is expected to become general somewhat sooner than had been anticipated, as buyers did little specifying against old contracts at the end of the quarter. Such tonnage as was ordered out is to be shipped during July. The new base price of 1.90c. at Detroit is also applicable as of July 1, and seems to be holding very well.

Tubular Goods

Oil country products are still the brightest spot in the pipe market, although demand is somewhat intermittent. Application of a new plan in the east Texas fields, calling for a maximum output of 50 bbl. a day from each well, is expected to result in considerable additional drilling by the leading producers, thus improving casing demand over the next 60 days. Line pipe is quiet. It is understood that Standard Oil Co. of Kansas has completed negotiations with another producer which will obviate the need for a new line. Active line pipe inquiry is lacking, and mills have little business on their books, except the tonnage placed recently by the Irak Petroleum Co., part of which is being rolled this week. Demand for mechanical tubing is unchanged, and boiler tubes are quiet.

Bars, Plates and Shapes

Although the past week has been very dull, fabricating shops are taking structural steel at a steady rate, and reinforcing bars are moving in fair volume for this time of the year. Heavy Government jobs are not as numerous as they were, but State highway work is still being placed in various parts of the country. Build-

ers of river craft are getting considerable inquiry for new equipment, but business is slow to be closed because of credit conditions and the uncertainty of future activity. Plate demand from other sources is almost entirely lacking, but the oil industry holds out considerable promise for future tonnage. Award of the plates for the Hoover Dam penstocks has been held up, but there was little chance of any of the material being rolled in the Pittsburgh district. Merchant bars show no activity, and aggregate business in alloy steels going to the automobile industry is still declining. Prices are giving mills little difficulty, as the greater part of the tonnage is sold at 1.60c., Pittsburgh.

Wire Products

Makers of merchant wire products are more interested in the future than the immediate present, as little business is in sight for July. Activity in the late summer and fall depends largely upon crops, but reports from the agricultural districts have been favorable thus far. Manufacturers' wire reflects no change in demand. Movement of spring wire is very light.

Tin Plate

Mill schedules were affected by the holiday week-end, but the average daily rate of production has not been changed materially. By next week schedules will again be up to 50 per cent of capacity, although recent releases have been barely sufficient to sustain this rate. Sharp variations in the operations of individual producers are still apparent, with some units engaged at as high as 75 per cent of capacity, while others are not above 35 per cent. The large container manufacturers are specifying conservatively.

Strip Steel

Mills report no change in the rate of specifications, and operations are suspended in most plants. Some of them will resume production before the end of the week, but current releases do not indicate that this will be necessary. A new single price on hot-rolled strip is gradually becoming established, and contract customers are generally covered for the third quarter. The price to large buyers is 1.45c., Pittsburgh, while carloads and less generally take 1.50c. Prices of cooperage stock have been revised, with the usual $2 differential over hot-rolled strip. Cold-rolled strip is well maintained at 2c., Pittsburgh.

Sheets

New business was negligible in the past week, and no marked change is in sight for this month. Shipments to the automobile industry will probably decline still further, although no immediate curtailment in the requirements of the Ford Motor Co. is expected. The other consuming lines are taking little material, and recent dullness will probably be accentuated by seasonal conditions. Mill operations were largely suspended over the week-end, and many units are not resuming production this week. As a result, schedules average well under 15 per cent of capacity. Prices show no change and are holding fairly well on most finishes of sheets. Hot-rolled annealed material is quotable at 2.20c., Pittsburgh, but concessions to large buyers are being continued into the third quarter in some cases. Galvanized sheets are comparatively firm at 2.85c., and ordinary hot-rolled at 1.55c., Pittsburgh.

Coke and Coal

Occasional sales of water gas coke make up the bulk of business in the furnace grade. Demand for foundry coke shows little change, although no further contraction has been noticed recently. Opening of the new rail-river terminal of the Pittsburgh & Lake Erie Railroad at Colona, Pa., provides for a lower freight rate on coal moving into the Shenango and Mahoning Valleys. A rail rate of 77c. a net ton has been published, which, with a 6c. emergency charge and a 12c. charge for transferring coal from barges to cars, brings the total rail charge to 95c. a net ton, as compared to the present all-rail rate from the Pittsburgh district to Youngstown of $1.40 a ton, including emergency charge. The new rate has not resulted in any marked change in coal movement to the Valleys, although many companies are expected to take advantage of the lower rate in the future.

Scrap

No sales into consumption have been made in the last few days, and the principal grades of scrap are quoted at the same levels as they were last week. Some distress tonnage is still bringing out exceptionally low figures, but the production of scrap in the Pittsburgh district has decreased almost as rapidly as consumption, and little surplus material is piling up. The monthly list of the Pennsylvania Railroad, on which bids will be taken July 6, contains 11,400 tons of scrap, including 1500 tons of heavy melting steel. The Baltimore & Ohio list, closing July 11, contains 3700 tons.

Birmingham Steel Output Higher; Pig Iron Still in Doldrums

BIRMINGHAM, July 5.—Pig iron buying continues to be restricted to the immediate requirements of the foundries, and these are small. Forward buying beyond a week or two is very infrequent. Some of the larger foundries place their expected monthly requirements either on the first or the first and fifteenth, but they are few in number. The furnace companies hope that June will prove to be the low point of the year. It is thought that July will show at least a slight increase in foundry melt. National Cast Iron Pipe Co., which has been idle for several weeks, plans to resume work during the present week. Here and there are other indications of a little more foundry activity, but the outlook in general is still uncertain and spotty. The price of No. 2 foundry for the Southern market remains steady at $11. Production of foundry iron at this time is not large, only two furnaces producing it, one each of the Woodward Iron and Sloss-Sheffield companies. Republic Steel has not been making foundry iron since the middle of April. It is now making spiegeleisen. Within the next week or 10 days the furnace will be changed back to basic or high silicon iron. The other active stack is on basic, this being Fairfield No. 6 of the Tennessee company. This is a total of four active in Alabama. There has been no change in number since late May.

Steel

After frequent weekly recessions, steel bookings during the past several weeks have been holding their own and the downward trend is temporarily stopped. One company lately has been reporting slight increase. The outlook has changed little from a routine character. Tonnages are not large nor have they affected operations to any extent. But the fact that June brought no further seasonal losses was comforting. No especial activity has developed for the third quarter. There was a limited amount of advance tonnage booked, but since prices are unchanged and carryovers from the second quarter were permitted, the incentive to cover in advance was lacking, Bookings of the fabricators were routine last week, orders averaging around 10 to 20 tons, with one or two exceptions. Open-hearth operations are being increased this week. Gulf States Steel resumed production at its open-hearth plant on July 4, with two units working. These open-hearths had been down since June 4. The Tennessee company continues with four at Fairfield.

Scrap

The monotony of a lifeless market is broken occasionally by a few inquiries and the shipping of a few cars on contracts. Prices are soft and unchanged.

Rail Release and General Upturn in Steel Bookings Buoy Up Sentiment at Chicago

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CHICAGO, July 5.—Foremost among new events in the local iron and steel market is the release of a substantial tonnage of rails, which will enable Chicago mills to resume operations this week after a layoff of more than two weeks.

Another interesting turn is that both sales and specifications, not including the rails referred to, are the best in four weeks. This development is not significant from the viewpoint of tonnage, but reflects a change in the trend of demand. There is also more interest in contracting by consumers, who for many months have consistently refused to consider future commitments.

Sentiment seems to be improving, and at least a moderate revival of business by arly fall is now looked for. In considering this possibility, consumers are trying to anticipate the course that prices may take at that time.

Ingot operations turned down over the week-end, as many consumers were shut down through the holiday and accordingly required less steel. Tuesday morning's mails reflected a slight backing up of requirements and, with rail mills resuming, it is reasonable to expect that ingot production will soon rise to 14 or 15 per cent of capacity.

Offerings of scrap indicate weakness in prices, but one mill is again taking small shipments and a moderate stiffening of the market is not beyond the realm of possibility. Northern pig iron prices, after wavering for many weeks, are off 50c. a ton on such business as is considered attractive.

Pig Iron

Northern foundry iron is quotable at $15.50 to $16 in a market that is dull. Shipments show little variation and inquiries do not at this time point to heavier demand. Southern iron and charcoal iron are moving in very small volume.

Wire Products

Most salesmen will take their vacations this month and so orders from the field are expected to be somewhat lighter than would otherwise be the case. Forward contracting has made fair headway and negotiations for contracts are still under way at prices that are well stabilized. Jobbers in the St. Louis territory find movement from stocks slightly heavier. In the Northwest the change for the better is quite marked, and it is believed that the demand from that section would be

Release against an old rail contract permits Chicago rail mills to resume operations.

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Pig iron prices are off 50c. a ton to $15.50, local furnace.

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The decline in scrap prices has not yet been halted, heavy melting grade having dropped another 50c. a ton.

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close to normal if the ore mines were operating. Crop conditions in the upper Mississippi Valley are excellent. The copper wire market is quiet, though no lower than in recent weeks.

Bars

Demand for mild steel bars remains steady. Inquiries are developing at a faster rate, and some buyers are giving more serious consideration to the placing of contracts. Steel makers are closely watching moves by farm implement manufacturers who are nearing the time when late summer and fall plans are made.

Bolts, Nuts and Rivets

Most producing plants are down for inventories. Some of them will not resume regular operations until business turns upward, in the meantime standing by and running off orders as received.

Warehouse Business

Prices for cold-finished bars are being advanced 5c. a 100 lb. in order to maintain the differential at $1.25 a 100 lb. between mill prices and those offered by warehouses. Base prices for hoops and bands remain the same, but new extras recently adopted by mills are now being applied to warehouses. Movement from stocks is slow and unit orders are small.

Reinforcing Bars

Stability of prices is one of the very few redeeming features of this market. Road steel shipments in Illinois are not up to expectations, and additional delays are at hand because of difficulties surrounding the right-of-way problem. Estimates are being made on the superstructure of the United States Appraisers Store, which is to be erected in Chicago. The volume of small orders is well sustained.

Cast Iron Pipe

Of outstanding importance in this market is the purchase by Milwaukee of 3700 tons in sizes ranging from 24 to 36 in. Bay City, Mich., and Decorah, Iowa, have ordered small tonnages. Carload orders are more numerous. In several sections of the Middle West the bond market shows improvement, and some sellers are now of the opinion that the last half of the year will show marked improvement in pipe sales. They point out that some municipalities with money at hand have hesitated to buy, but that they will want to finish contemplated work before fall and therefore will place orders in the next 60 to 90 days.

Plates

An attractive tonnage of tank work is in prospect. Reports from most oil fields indicate that sentiment has improved as a result of the higher prices being asked by some producers of petroleum.

Structural Material

Awards this week include an impressive number of highway bridge jobs scattered up and down the Mississippi Valley. Fresh inquiries are limited and are mostly for highway bridge work. A hitch in the plans for a medical arts building at Duluth may hold up this project temporarily, although it is believed that the placing of 1500 tons needed will not be delayed very long. A Chicago contractor is low bidder on the Minneapolis post office, which will take 5000 tons.

Rails and Track Supplies

An appreciable tonnage of rails has been released by one railroad and Chicago mills will resume operations immediately after July 4 following a two weeks' layoff. This tonnage is against an order placed over a year ago. The needed accessories will be specified in the near future.

Scrap

Prices continue to give ground and dealers, often pressed with distress tonnages, continue to name lower quotations. Under these conditions it is often necessary for dealers to put tonnages on the ground. In some quarters there is the feeling that prices are near bottom, but speculation is hampered by lack of available credit. Railroad offerings are light and few bids are entered against these tonnages. Activity in car wrecking is at an end for the time being.

New York Steel Demands Are Narrowed by Plant Idleness

Industrial Shutdowns Numerous This Month—Bids on New York Central Steel in Line with Current Market

NEW YORK, July 5.—Sales offices received an increased volume of specifications for sheets and strip steel at the end of June against expiring second quarter contracts in instances where consumers had protection at prices below those now quoted. In a few cases total sales last month were brought up slightly above those of May. Nevertheless, the general market picture is exceedingly drab. Numerous plant shutdowns this month have narrowed the field of steel consumers. Steel companies are at a loss in trying to determine when a real turn for the better will come, but few expect that there will be much change during July and August.

Meanwhile, the price situation, though not without some irregularities, is firmer. This is particularly true of bars, plates and shapes, while the sheet and strip mills have got rid of their low-priced obligations with the passing of the second quarter. On a recent inquiry for about 25,000 boxes of tin plate there was a wide variety of quotations, most of them sharp concessions from the official price.

The New York Central Railroad opened bids on June 28 for its third quarter requirements. Practically all bids submitted were in line with current published quotations, though Chicago mills quoted 1.60c. a lb., f.o.b., on bars, plates and shapes. Only a few steel companies submitted bids for steel scrap, which the railroad offered in exchange for finished steel. The highest scrap bid is reported to have been $6 a ton, delivered.

The steel market is almost barren of important prospects. Outside of the building industry there is, in fact, almost nothing. Forty miles of 20-in. pipe for a gas line in the Tioga fields of Pennsylvania is in prospect, but is not yet an active inquiry.

Pig Iron

The lethargic condition of this market is virtually unchanged. Facing a month of further recessions in foundry operations, pig iron sellers are offered little encouragement for improvement at least for four or five weeks. With consumer stocks of pig iron generally depleted, however, some hope is held out that accumulations of castings orders during the July shutdowns will bring a decided spurt in demand at the close of the month. Sales in the past week aggregated about 1300 tons, compared with 1000 tons in each of the two preceding weeks. With current bookings consisting chiefly of car lots, prices are untested and unchanged.

Reinforcing Bars

The only new sizable project that appeared in the past week is the Veterans Hospital at Batavia, N. Y., which will require about 225 tons of bars. Prices of 1.60c., Pittsburgh, and 1.95c., New York, are still being held on normal lots. In certain cases where Buffalo mills have an advantage, Central district mills are quoting on the basis of 1.60c., Buffalo, with 33c. freight to New York.

Scrap

Holiday shutdowns have accentuated the dullness of this market, and demand for all grades is virtually nonexistent. In the absence of significant trading, prices are nominally unchanged.

Award Delayed on Large St. Louis Structural Job

ST. LOUIS, July 5.—The local maker of pig iron reports that shipments during June were fully equal to those of May. Most of the June business was in specifications against contracts, there having been very few spot orders. An encouraging factor has been the resumption of operations by one of the largest stove plants in the district. Most stove foundries closed down last Friday and will not resume operations until July 11. Third quarter opens with pig iron prices unchanged.

Steel

Award of the general contract for the St. Louis Municipal Auditorium to Boaz-Kiel Construction Co., low bidder, has been postponed until July 14, pending the settlement of an injunction suit. The building will require 4000 tons of structural steel and 2500 tons of reinforcing bars. Specifications are being received for structural shapes required for highway projects already let in Missouri, Texas and Oklahoma. Railroads have been ordering small tonnages for bridge repair work, but are otherwise out of the steel market. Second quarter prices on plates, shapes and bars have been reaffirmed for third quarter, and the market is steady despite the lack of tonnage.

Scrap

Railroad springs, heavy turnings and borings and shoveling turnings are off following recent purchases by dealers; otherwise the scrap market is unchanged. The only railroad list of the week—170 carloads—was issued by the Missouri Pacific.

New England Pig Iron Market Is Dull

BOSTON, July 5.—The slight flurry in pig iron buying, noted a week ago, has petered out, and the market is again virtually at a standstill. A large majority of New England foundries are closed or practically so, many still have iron on contract, and some are using about 90 per cent of textile and No. 1 machinery cast in their melts; consequently the outlook for pig iron buying is far from bright.

The Boston & Worcester Street Railway Co. has sold approximately 3000 tons of scrap rails, 150 tons of copper and all its cars and miscellaneous scrap to Joseph Gordon, formerly with Citron & Byer, Trenton, N. J., and the State of Massachusetts is removing the rails. Final sale of the scrap to mills is pending. There is a possibility of the rails for rerolling being handled by the American Steel & Iron Co., this city. Several smaller lots of rails, ranging from 100 to 200 tons have been purchased by dealers. It is reported the American Steel & Wire Co., Worcester, Mass., has bought a tonnage of scrap rails formerly the property of the Pittsfield, Mass., traction company. A boat is loading 2500 tons of scrap here for Sydney, Cape Breton. Scrap dealers generally report the market in the doldrums.

Pacific Coast Awards About 1,800 Tons

SAN FRANCISCO, July 2.—Although work has been started at Hamilton Field, the Government's new $5,000,000 bombing base at Marin Meadows, Cal., contracts have yet to be let for 600 tons of reinforcing bars and 950 tons of structural steel for various buildings and 200 tons of cast iron pipe for the sewer system.

Bids on a number of jobs are being taken within the next week. Activity the past week has been only fair, with awards on major projects approximately 1800 tons. New inquiries call for 1700 tons of steel.

The first issue of the *Whiting Founder* has been published, as the spring number, by the Whiting Corpn., Harvey, Ill.

Cleveland Steel Output Declines to 17 Per Cent of Capacity

CLEVELAND, July 5.—With the very limited demand for finished steel, the holiday period had little effect on the volume of business. New demand, which is limited to small lots, is in about the same volume as during the past few weeks. However, owing to the booking of some orders outside the regular run of business, some of the mills did better in June than in May.

The Corrigan, McKinney Steel Co. resumed the operation of four open-hearth furnaces today, but, with the shutting down of the open-hearth plant of the American Steel & Wire Co. until next Monday and with the two furnaces in operation by the Otis Steel Co., the local steel plants are running this week at 17 per cent of ingot capacity. With many mills shut down, sheet mill operations in northern Ohio will be very low throughout July.

The outlook for the next few weeks is far from encouraging. Demand from the automotive industry is expected to decline this month, as it is reported that the Ford Motor Co. has made a slight reduction in its production schedule for July and will make a further cut in August. Some of the other motor car companies are working on new models, but it probably will be some time before these are brought out.

That motor trucks are becoming a factor of increasing importance in the transportation of steel is indicated by the announcement of one trucking company that it will haul steel from the Pittsburgh district to Cleveland at the carlot rates charged by the railroads. This is of particular interest to consumers, as they will be able to secure shipments by motor trucks of less-than-carload lots at the carlot rates.

Iron Ore

With the very limited demand for iron ore, shipments from the Lake Superior district showed little increase in June over those of May. The movement by water last month was 233,557 gross tons. Total water shipments up to July 1 were only 388,456 tons, compared with a movement of over 5,600,000 tons during the same period last year.

Pig Iron

Orders were very scarce the past week and little inquiry is pending. Demand is limited mostly to small lots for immediate needs. Some furnaces shipped about as much iron in June as during the previous month, but with others shipments declined last month. Foundry operations show no signs of improvement. Quotations are unchanged at $14 to $14.50, Cleveland, for foundry and malleable iron for outside shipments and $15.50 for local delivery. However, the latter price is a nominal quotation, as the local market has not been tested for several weeks.

Bars, Plates and Shapes

Inquiries are pending for three Ohio post offices, each requiring a small tonnage, but aside from these there is very little activity in the building field. The Cleveland post office, requiring 10,000 tons is not expected to come out before September. Bars and plates are dull. Prices are firm at 1.65c., Cleveland, for bars and 1.60c., Pittsburgh, for plates and shapes. The new extras on commercial forging bars became effective July 1. Round bars from 1 in. to 1½ in. in diameter or flats and squares in equivalent cross-sectional area carry a $3 a ton extra and those of 1½-in. diameter and over a $5 a ton extra. Bars 1 in. and smaller carry no extra. Concessions on alloy steel bars to 2.45c. base are quite frequent, although 2.65c. is still maintained for smaller consumers. The alloy steel bar situation is expected to be clarified shortly by the announcement of new quantity differentials.

Sheets

Enameling sheets are in fair demand from manufacturers of washing machines, and business from stove manufacturers has improved. The price is irregular, with 3c. rather commonly quoted for No. 20 gage. Demand for sheets from the refrigerator industry has declined sharply. Little business is coming from the motor car industry. Prices are being well maintained on most grades.

Strip Steel

Demand for hot-rolled strip is very light and there has been little test of the new single base price of 1.45c., although producers seem determined to maintain the new schedule. Cold-rolled strip is steady at 2c., Cleveland.

Scrap

A few consumers who have been taking a limited amount of scrap suspended shipments entirely July 1. Two others have continued to take small lots of machine shop turnings. There is a demand for breakable cast scrap for delivery to a Pittsburgh district mill at $7.50, bringing this grade down to $4.50, Cleveland, for delivery to this consumer. The market is weak and prices generally are nominal.

Buffalo Steel Output Low This Week

BUFFALO, July 5.—The holiday period was influential in almost halting all pig iron business. A few small lots were booked, but no sizable inquiries came out. The Bond plant of the American Radiator Co. has resumed production after a shutdown of several weeks.

Steel

The Lackawanna plant of Bethlehem Steel discontinued operations last Friday and resumed today (July 5) with four furnaces. Republic Steel was idle over the holidays, and probably will resume Monday, July 11. Seneca Iron & Steel Co. is operating at 15 to 18 per cent. Wickwire Spencer will start an open-hearth furnace this week.

Scrap

With the resumption of operation of one of the plants of a radiator interest, a few small releases for No. 1 heavy melting steel, stove plate and No. 1 machinery cast are reported. It is understood that the sale of No. 1 heavy melting steel by a railroad to a mill here, noted last week, was of a reciprocal nature.

Cincinnati Pig Iron Demand Sluggish

CINCINNATI, July 5.—Pig iron demand continues sluggish. Small current bookings averaging less than 600 tons weekly are reported for immediate use of melters. Interest in future requirements is lacking. Shipments are slow, most consumers being behind on their contracts. Several foundries have shut down for all of July. Prices on Northern iron are subject to concessions, but Southern iron remains firm at $10, base Birmingham, but without test.

Coke

By-product foundry coke continues to be quoted at $9.05, delivered Cincinnati. New business is small, and shipments reflect the low melt.

Scrap

The scrap market is dull and featureless. Price schedules are nominal.

Railroad Releases of Steel Gain in Eastern Pennsylvania

PHILADELPHIA, July 5.—The holiday shutdown has brought down steel operations in this district to about 11 per cent of capacity. Some units will resume output tomorrow in both the steel works and mill departments, while one plant will remain entirely idle over the remainder of the week. Next week it will put on its billet, plate and sheet mills, with open-hearth furnaces remaining inoperative. The holiday period saw no important accumulation of tonnages, with the result that bookings are light.

There has been an increase in railroad releases. The tonnages consist principally of shapes, plates and bars to be used for locomotive and car repair work. The Pennsylvania has released orders for 20,000 tons of rails to three mills. Part of the tonnage is said to have been rolled.

Pig Iron

Low prices of foreign pig iron have softened domestic prices and No. 2 plain now is quoted at $13.50 to $14, furnace. Some domestic makers, however, are holding at the higher figure and report a slight increase in orders. One seller found orders almost negligible early in June, but reports they now range from a carlot to 400 tons and average about 275 tons. There has been a narrowing of differentials in grades and in instances they have been entirely waived. The practice, common with foreign iron, is said to be not general for domestic grades.

Sheets

Orders are extremely light. Automobile body builders are taking occasional tonnages but are operating at a low rate.

Plates, Shapes and Bars

Railroads have been placing orders in slightly increased volume. Most of the steel is for repairs to locomotives and cars. It is understood that the Pennsylvania Railroad will release about 2000 tons this week for the Newark, N. J., viaduct and that subsequent releases in connection with its electrification and terminal improvement work will be gradual. This railroad also has taken a small lot of plates for locomotive boiler repair work. Prices are apparently holding well. Mill books are said to be almost entirely clear of preferential business going to larger users. These now are on a price parity with smaller consumers. Bids will be opened on Thursday in Washington for two lighthouse tenders, involving about 450 tons of plates.

Warehouse

Jobbers have scaled prices of cold-finished steel by $3 a ton. Rounds and hexagons have been reduced to 3.35c. a lb. and squares and flats to 3.85c. The material takes a 15c. minimum extra, however, for screw stock quality on the following: Rounds up to and including 3½ in.; all hexagons; squares, including and up to 1½ in. These extras place jobbers practically on the same basis as the mills.

Imports

Imports last week included 6008 tons of pig iron from the Netherlands and 500 tons of ferromanganese from Germany.

$2,850,000 Colombia Job to U. S. Firm

WASHINGTON, July 5.—A contract has been awarded an American firm to undertake the $2,850,000 harbor improvement work at Cartagena, Colombia, with work to be completed within 24 months, says a report from Vice-Consul Stephen C. Worster, Cartagena. The work includes the dredging of the harbor and the dredging of the entrance from the Dique Canal to Cartagena Bay as well as for a part of the canal.

The port work is to consist of a reinforced concrete dock 1067 ft. long and two similarly constructed piers of 664 ft. in length and 130 ft. in width. Each of the piers will be equipped with two warehouses. The docks and piers will be equipped with a number of cranes for handling freight. The cranes will have capacities ranging from 3 to 15 tons each. Other equipment includes one 100-hp. tug, one launch of 30 hp., six cargo lighters and the necessary miscellaneous equipment for handling cargo. The contract also calls for the construction of suitable protection and facilities for a seaplane port.

Organize to Force Governmental Economy

Manufacturers' associations from 15 States recently held a meeting at the headquarters of the Illinois Manufacturers' Association to take preliminary steps to present a specific program for governmental economy. The State associations, represented by their secretaries, were from Illinois, Indiana, Iowa, Ohio, Michigan, Wisconsin, Minnesota, Kentucky, Nebraska, South Dakota, Vermont, Virginia, West Virginia, Florida and Tennessee.

Definite curtailment of Federal bureaus, especially where these overlap and are duplicated, will be recommended, together with a percentage reduction in total appropriations. These recommendations are to be made upon a survey and an analysis of all governmental bureaucratic and departmental activities. They will be presented in time to influence action by Congressional committees.

It was decided to call a general meeting of all national trade associations and State manufacturers' associations in New York on July 12. This will be immediately following the annual meeting of the National Industrial Council.

Trade Notes

R. L. Batteiger, Widener Building, Philadelphia, has been appointed exclusive sales representative of the Eastern territory for lime and limestone produced by the Thomasville Stone and Lime Co., Thomasville, Pa. Mr. Batteiger has for some time represented the Thomasville company in its sale of products to steel mills and hereafter will also represent that company in sales to the paper and glass trade through the North Atlantic territory, including New England.

Natroy Steel Corpn., Jamestown, N. Y., has opened a branch office at 15 Franklin Street, Buffalo. The Natroy corporation is jobber for J. W. Brainard Steel Co., Warren, Ohio; Fitzsimons Co., Youngstown, Ohio; Apollo Steel Co., Apollo, Pa.; Superior Sheet Steel Co., Canton, Ohio; Buckeye Brass & Mfg. Co., Cleveland; Central Iron & Steel Co., Harrisburg, Pa., and New Jersey Zinc Co., Aquashicola, Pa.

Hanna Furnace Corpn., merchant pig iron division of National Steel Corpn., has removed its Detroit office to 11-210 General Motors Building.

Stephens-Adamson Mfg. Co., Aurora, Ill., manufacturer of conveying, screening and variable-speed transmission machinery, has opened a branch office in the Cutler Building, Rochester, N. Y. F. H. Wisewell, engineer, has been appointed district manager.

Hillside Fluorspar Mines, Chicago, have withdrawn, effective July 2, from the Oglebay, Norton & Co.'s Cleveland selling agency for fluorspar and will hereafter handle all sales from their Chicago office, 38 South Dearborn Street.

Cadalyte is the name of a process for plating with cadmium which is sponsored by the Grasselli Chemical Co., Cleveland. It is claimed to be a simpler, more economical method and to consume less time than other processes.

Fabricated Structural Steel

Awards and New Projects in Small Volume

WITH lettings of only 6300 tons, the past week has been one of the dullest this year. Bookings were mostly in small tonnages, the largest, 1150 tons, for a post office and court house in Knoxville, Tenn. New projects of 10,000 tons compare with 11,300 tons in the previous week. The Illinois Waterway Commission will require 2000 tons for bridges, and a post office in Rochester, N. Y., will take 1300 tons. Contracts in June were the largest for any month since last October, totaling 127,800 tons. Awards follow:

NORTH ATLANTIC STATES

Brookline, Mass., 100 tons, Dean Road bridge, to McClintic-Marshall Corpn.

Paterson, N. J., 520 tons, post office, to Bethlehem Fabricators, Inc.

State of Pennsylvania, 370 tons, highway bridge in Washington-Greene counties, to Fort Pitt Bridge Works Co.

Smyrna, Del., 175 tons, State home, to Montgomery Co.

Jefferson County, N. Y., 220 tons, highway bridge, to Luten Bridge Co.

New Windsor, N. Y., 300 tons, highway bridge, to American Bridge Co.

Norristown, Pa., 200 tons, post office, to Lehigh Structural Steel Co.

Smyrna, Pa., 175 tons, State building, to Montgomery Iron & Steel Co.

Norristown, Pa., 185 tons, post office, to Lehigh Structural Steel Co.

THE SOUTH

Jasper, Ala., 100 tons, Walker County court house, to Southern Steel Works.

Knoxville, Tenn., 1150 tons, post office and court house, to Ingalls Iron Works.

CENTRAL STATES

Pennsylvania Railroad, 200 tons, three bridges in Ohio, to American Bridge Co.

Sanford, Mich., 100 tons, highway bridge, to R. C. Mahon Co.

Kenosha, Wis., 160 tons, post office, to Lakeside Bridge & Steel Co.

Taylor County, Wis., 300 tons, bridge, to Milwaukee Bridge Co.

State of Iowa, 215 tons, bridges; 100 tons to Clinton Bridge Works, 115 tons to Pittsburgh-Des Moines Steel Co.

Jasper County, Mo., 300 tons, highway bridge, to Missouri Valley Bridge & Iron Co.

Belle Plaine, Kan., 300 tons, bridge, to Ben Siebeitt Iron & Foundry Co.

Wichita, Kan., 250 tons, Government hospital, to Birmingham Ornamental Iron Works.

WESTERN STATES

Coolidge, Ariz., 115 tons, steel shelter, to Virginia Bridge & Iron Works.

Hoover Dam, 534 tons, additional tonnage on Stoney Gates, to Consolidated Steel Co.

Seattle, 100 tons, University of Washington law school, to Hofius Steel & Equipment Co.

State of Oregon, 110 tons, highway bridges, to various bidders.

Casa Grand Park, Cal., 150 tons, shelter house, to Allen Brothers.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Bellows Falls, Vt., 200 tons, hotel and stores.

Saco, Me., 100 tons, Boston & Maine Railroad bridge.

Newton, Mass., 370 tons, two highway bridges.

State of New York, 690 tons, highway bridges.

Peekskill, N. Y., 200 tons, building for Standard Brands, Inc.

Rochester, N. Y., 1300 tons, post office.

Atlantic City, N. J., 200 tons, building for Atlantic City Gas Co.

Washington, 300 tons, theater.

State of Pennsylvania, 550 tons, two highway bridges.

Wilmington, Del., 245 tons, high school.

Philadelphia, 700 tons, addition to Federal Reserve Bank.

Philadelphia, 1000 tons, building for Bell Telephone Co., Ninth and Race Streets.

Downington, Pa., 150 tons, high school; H. J. Hoffman, Philadelphia, general contractor.

CENTRAL STATES

Minneapolis, 4000 tons, post office, N. P. Severin Co., Chicago, low bidder.

Chicago, 500 tons, United States Appraisers Store.

Chicago, 300 tons, William Dever crib.

State of Illinois, 2000 tons, bridges for Illinois Waterway Commission.

State of Wisconsin, 188 tons, two bridges in Trempealeau County; bids to be taken July 14.

State of Wisconsin, 325 tons, Lone Rock bridge; bids to be taken July 12.

Painesville, Ohio, 150 tons, post office.

WESTERN STATES

San Joaquin County, Cal., 223 tons, State highway bridge over Paradise Cut; bids to be called July 20.

Roseburg, Ore., 270 tons, bridge at Veterans' Home; bids to be called July 18.

Oahu, T. H., 100 tons, tower at Fort Weaver; bids closed June 23.

FABRICATED PLATE

AWARDS

Grand Rapids, Mich., 220 tons, 1,500,000-gal. standpipe, to Pittsburgh-Des Moines Steel Co.

Coffeyville, Kan., 370 tons, heaters for Sinclair Refining Co., to Lackawanna Steel Construction Corpn.

Oakland, Cal., 250 tons for East Bay Municipal Utility District, to Berkeley Steel Contruction Co.

NEW PROJECTS

Milwaukee will ask bids about Aug. 1 for one 6,000,000-gal. steel storage tank for water department.

Reinforcing Steel

Awards 1350 Tons—New Projects 1400 Tons

AWARDS

Washington, 400 tons, auditorium connecting Interstate Commerce Commission and Department of Labor building, to Rosslyn Steel & Cement Co.

Washington, 260 tons, tunnels, Howard University, to Kalman Steel Co.

San Francisco, 120 tons, Fort Mason dock extension No. 2, to Gunn, Carle Co.

Oakland, Cal., 135 tons, Park Boulevard, trestle, to W. C. Hauck & Co.

Hanford, Cal., 100 tons, County hospital addition, to Kyle Steel Construction Company.

State of Oregon, 201 tons, highway bridges; to various bidders.

Seattle, 105 tons, art museum, to Pacific Coast Steel Corpn.

NEW REINFORCING BAR PROJECTS

State of Indiana, 500 tons paving work; bids to be opened July 16.

Chicago, tonnage being estimated, United States Appraisers Store.

Minneapolis, 100 tons, Veterans' Hospital.

Sunnyvale, Cal., 290 tons, buildings under Specification 6874; bids called July 6.

Ada County, Idaho, 220 tons, two State highway bridges and approaches; bids July 8.

Seattle, 100 tons, State highway undercrossing at Sixty-third and Aurora Streets; bids July 26.

Seattle, 152 tons, undercrossing at Forty-sixth and Aurora Streets; bids called July 19.

Batavia, N. Y., 225 tons, Veterans Hospital.

Pipe Lines

Syracuse Lighting Co., Syracuse, N. Y., a subsidiary of Niagara Hudson Power Corpn., same address, has authorized immediate construction of a new welded steel pipe line from Syracuse to Onondaga, N. Y., about 15 miles, where connection will be made with main pipe line system from Tioga, Pa., natural gas fields. New line will be used for service at Syracuse and vicinity. Mixing plant will be installed in city. Cost over $200,000.

Texas Oil Co., Houston, Tex., has awarded contract to Apex Construction Co., Tulsa, Okla., for 4½-in. crude oil pipe line from Port Barre oil fields to point known as Anchorage on Mississippi River, near Baton Rouge, La., about 46 miles. Cost over $175,000 with equipment.

Central States Electric Co., Dows Building, Cedar Rapids, Iowa, has secured natural gas franchise at Creston, Iowa, and vicinity and plans installation of pipe line connecting with main trunk system.

Cast Iron Pipe

United States Veterans Hospital, Batavia, N. Y., will open bids July 12 on 100 tons of 3- and 6-in.

Milwaukee placed 3652 tons of class C with James B. Clow & Sons Co., 174 tons of 24- and 36-in. with Donaldson Iron Co., and 115 tons of 24- and 36-in. special castings with Bessemer Foundry & Machine Co.

Fond du Lac, Wis., will be in the market for 6000 lin. ft. of 14- or 16-in. late in summer, after completion of new 20-in. well to be started about July 15.

Whittier, Cal., will call bids July 18 for about 333 tons of 4- to 10-in.

Detroit Scrap Market

DETROIT, July 5.—The Fourth of July holiday, added to an already apathetic interest on the part of users, brought an almost complete suspension of activities the past week in the local scrap market. The price of flashings was temporarily strengthened by a sale of this item to a Hamilton, Ont., consumer. Otherwise, quotations are weak, with a few grades off 50c. a ton. Aside from small tonnages of hydraulic bundles, the local steel plant is holding up indefinitely all scrap shipments. Little scrap is being turned out in this district, and the most active producer at the moment, the Ford Motor Co., is holding to its policy of refraining from offering large quantities of scrap in the open market.

Resignations from Copper Exporters Force Foreign Price Lower

NEW YORK, July 5.—Copper buying has practically ceased, the lack of demand having been intensified by the holiday recess. Chief interest centers in the developments going on within Copper Exporters, Inc., and the effect of these on the foreign price. Practically all of the foreign producer members, except perhaps one, have resigned and are competing for such foreign business as there is. Fair sales are reported at around 5c. a lb., c.i.f. usual European ports, with most of the American producers out of this market. One domestic refiner is reported to have sold for foreign delivery at about 5c. a lb. This price contrasts with 5.50c. as that of the export organization. Domestic prices are unchanged at 5.37½c. for electrolytic, delivered Connecticut. Thus far the new tariff has had little effect on the market, owing to large stocks in this country.

Copper Averages

The average price of Lake copper for June, based on daily quotations in THE IRON AGE, is 5.50c. a lb., delivered New York. The average price of electrolytic copper is 5.11½c., refinery, or 5.36½c., delivered Connecticut.

Tin

This market is stagnant. It is believed that consumers are not covered far ahead, but there is no incentive to buy under present conditions. Quotations in London today were considerably higher than a week ago, with spot standard quoted at £123 12s. 6d., future standard at £125 7s. 6d., and spot Straits at £128 15s., due largely to conditions in the Far East. The Singapore price was £129 2s. 6d., or more than £10 a ton higher than a week ago. This quotation, due to the Byrne plan, is what buyers would pay if exports were possible. Spot Straits tin at New York today was quoted at 20.37½c. a lb., values having gradually risen in sympathy with advances at London.

Lead

Buying has been fairly active even at declining prices. Several reductions in the quotation of the leading producer, the latest one today, bring that price down to 2.85c. a lb., New York. Other producers are taking business at 2.75c., New York. The quotation of the principal smelter in the West is 2.70c., St. Louis, but metal is changing hands in that district at 2.60c. The market is therefore quoted on a basis of 2.60c., St. Louis, or 2.75c., New York.

Zinc

In the absence of any substantial demand, there has been an easing in values due to eagerness of some producers to book prompt and nearby prime Western metal, which is now available at 2.67½c. a lb., East St. Louis, or 3.04½c., New York. Such buying as has developed has been limited to carload and smaller lots, mostly for nearby delivery. Sales last week are reported to have been about 1300 tons, with output at only 600 tons, indicating liberal withdrawals from stocks. Ore prices continue firm at $18 to $20 a ton, Joplin, with some sales reported at the higher level.

The General Electric Co. plant at Pittsfield, Mass., has recalled a number of skilled employees to work on a new oil-burning furnace to be manufactured there. The first heaters made will be used as models. The plant has received a fair-sized order for large transformers, and the power transformer department is enjoying a fair business, while business in the distributing transformer department has held up well.

Automobile production in Canada in May totaled 8221 cars, compared with 6810 cars in April, according to the Dominion Bureau of Statistics. Total production in the first five months of 1932 was 32,557 cars, compared with 59,250 cars in the corresponding period of 1931.

At the Century of Progress Exhibition in Chicago in 1933, the Union Carbide & Carbon Corpn. will present the "Story of Air" and the "Story of the Electric Furnace" in the Hall of Science. There will also be a general exhibit by units of the corporation.

The Week's Prices, Cents Per Pound for Early Delivery

	June 29	June 30	July 1	July 2	July 5
Lake copper, New York	5.50	5.50	5.50	5.50	5.50
Electrolytic copper, N. Y.*	5.12½	5.12½	5.12½	5.12½	5.12½
Straits tin, spot, N. Y.	19.60	20.20	20.37½		20.37½
Zinc, East St. Louis	2.75	2.67½	2.67½	2.67½	2.67½
Zinc, New York	3.12	3.04½	3.04½	3.04½	3.04½
Lead, St. Louis	2.80	2.60	2.60	2.60	2.60
Lead, New York	2.95	2.75	2.75	2.75	2.75

*Refinery quotation; price ½c. higher delivered in the Connecticut Valley.
Aluminum, 98 to 99 per cent pure, 22.30c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 5.00c. a lb., New York.
Brass ingots, 85-5-5-5, 6.00c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	22.50c. to 23.50c.
Tin, bar	24.50c. to 26.50c.
Copper, Lake	7.50c. to 8.50c.
Copper, electrolytic	7.25c. to 8.25c.
Copper, casting	7.00c. to 8.00c.
*Copper sheets, hot-rolled	14.87½c.
*High brass sheets	12.00c.
*Seamless brass tubes	15.25c.
*Seamless copper tubes	14.37½c.
*Brass rods	9.75c.
Zinc, slabs	4.25c. to 4.75c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	4.00c. to 4.50c.
Lead, bar	5.75c. to 6.75c.
Lead sheets	7.50c.
Antimony, Asiatic	8.00c. to 9.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	16.00c. to 17.00c.
Solder, ½ and ½	14.75c. to 15.75c.
Babbitt metal, commercial grade	18.00c. to 28.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	23.25c.
Tin, bar	25.25c.
Copper, Lake	6.50c.
Copper, electrolytic	6.50c.
Copper, casting	6.25c.
Zinc, slab	4.25c. to 4.50c.
Lead, American pig	3.75c. to 4.00c.
Lead, bar	7.25c.
Antimony, Asiatic	9.00c.
Babbitt metal, medium grade	14.50c.
Babbitt metal, high grade	27.25c.
Solder, ½ and ½	15.75c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	4.00c.	4.50c.
Copper, hvy. and wire	3.75c.	4.375c.
Copper, light and bottoms	2.875c.	3.50c.
Brass, heavy	1.75c.	2.25c.
Brass, light	1.25c.	1.75c.
Hvy. machine composition	2.75c.	3.25c.
No. 1 yel. brass turnings	2.00c.	2.50c.
No. 1 red brass or compos. turnings	2.50c.	3.00c.
Lead, heavy	2.00c.	2.50c.
Zinc	1.00c.	1.375c.
Cast aluminum	2.50c.	4.00c.
Sheet aluminum	6.50c.	8.00c.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

Base per Lb.

F.o.b. Pittsburgh mill .....1.60c.
F.o.b. Chicago .....1.70c.
Del'd Philadelphia .....1.91c.
Del'd New York .....1.95c.
Del'd Detroit .....1.80c.
F.o.b. Cleveland .....1.65c.
F.o.b. Lackawanna .....1.70c.
F.o.b. Birmingham .....1.75c.
C.i.f. Pacific ports .....2.10c.

Billet Steel Reinforcing
(as quoted by distributers)

F.o.b. P'gh mills, 40, 50, 60-ft....1.60c.
F.o.b. Birmingham, mill lengths...1.75c.
F.o.b. Cleveland .....1.60c. to 1.75c.

Rail Steel

F.o.b. mills, east of Chicago dist .....1.20c. to 1.25c.
F.o.b. Chicago Heights mills.....1.50c.

Iron

Common iron, f.o.b. Chicago.....1.65c.
Refined iron, f.o.b. P'gh mills.....2.75c.
Common iron, del'd Philadelphia...2.11c.
Common iron, del'd New York.....2.12c.

Tank Plates

Base per Lb.

F.o.b. Pittsburgh mill .....1.60c.
F.o.b. Chicago .....1.70c.
F.o.b. Birmingham .....1.75c.
Del'd Cleveland .....1.8035c.
Del'd Philadelphia .....1.7935c.
F.o.b. Coatesville .....1.70c.
F.o.b. Sparrows Point .....1.70c.
Del'd New York .....1.898c.
C.i.f. Pacific ports .....2.00c.

Structural Shapes

Base per Lb.

F.o.b. Pittsburgh mill .....1.60c.
F.o.b. Chicago .....1.70c.
F.o.b. Birmingham .....1.75c.
F.o.b. Lackawanna .....1.70c.
F.o.b. Bethlehem .....1.70c.
Del'd Cleveland .....1.8035c.
Del'd Philadelphia .....1.7495c.
Del'd New York .....1.86775c.
C.i.f. Pacific ports (standard)....2.10c.
C.i.f. Pacific ports (wide flange)..2.20c.

Steel Sheet Piling

Base per Lb.

F.o.b. Pittsburgh .....1.90c.
F.o.b. Chicago mill .....2.05c.
F.o.b. Buffalo .....2.00c.

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.45c. to 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2000 (1½% Nickel)	$0.25
2100 (1½% Nickel)	0.55
2500 (3½% Nickel)	1.50
2700 (6% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
6100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and Squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets unde 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

Base per Lb.

Bars, f.o.b. Pittsburgh mill.....1.70c.
Bars, f.o.b. Chicago.....1.75c.
Bars, Cleveland .....1.75c.
Bars, Buffalo .....1.75c.
Bars, Detroit .....1.90c.
Bars, eastern Michigan.....1.95c.
Shafting, ground, f.o.b. mill..... .....†2.05c to 3.00c.

*In quantities of 10,000 lb. or more.
†According to size.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot-rolled

Base per Lb.

No. 10 f.o.b. Pittsburgh .....1.55c.
No. 10 f.o.b. Chicago mill .....1.65c.
No. 10 del'd Philadelphia .....1.86c.
No. 10 f.o.b. Birmingham .....1.70c.
No. 10, c.i.f. Pacific Coast ports..2.17½c.

Hot-rolled and Annealed

No. 10, Pittsburgh .....1.70c.
No. 10, Chicago mills .....1.80c.
No. 10, Birmingham .....1.85c.
No. 10, Pacific Coast ports.....2.32½c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh .....2.20c.
No. 24, f.o.b. Chicago mills .....2.30c.
No. 24, del'd Philadelphia..2.46c. to 2.51c.
No. 24, f.o.b. Birmingham .....2.35c.
No. 24, c.i.f. Pacific Coast ports..2.85c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh .....2.25c.
No. 10 gage, f.o.b. Chicago mills..2.35c.
No. 10 gage, del'd Philadelphia ...2.46c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh .....2.75c.
No. 20 gage, f.o.b. Chicago mills..2.85c.
No. 20 gage, del'd Philadelphia ...3.06c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh..2.85c. to 2.90c.

Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh .....2.65c.
No. 20, f.o.b. Pittsburgh .....3.15c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets

No. 24, f.o.b. Pittsburgh .....2.85c.
No. 24, f.o.b. Chicago mills.....2.95c.
No. 24, del'd Philadelphia .....3.16c.
No. 24, f.o.b. Birmingham .....3.00c.
No. 24, c.i.f. Pacific Coast ports...3.50c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh .....2.80c. to 3.00c.

Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh .....2.60c.
No. 20, f.o.b. Pittsburgh .....3.10c.

Tin Mill Black Plate

No. 28 f.o.b. Pittsburgh .....2.40c.
No. 28 Chicago mill .....2.50c.

Tin Plate

Base per Box

Standard cokes, f.o.b. P'gh district mill $4.75
Standard cokes, f.o.b. Gary..... 4.85

Terne Plate

(F.o.b. Morgantown or Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C. $9.50
15-lb. coating I.C. 12.00
20-lb. coating I.C. 13.00
25-lb. coating I.C. 14.10
30-lb. coating I.C. 14.90
40-lb. coating I.C. 16.70

Hot-rolled Hoops, Bands and Strips

Base per Lb.

All widths up to 24 in., Pittsburgh .....1.45c. to 1.50c.
All widths up to 24 in., Chicago .....1.55c. to 1.60c.
Cooperage stock, P'gh.....1.55c. to 1.60c.
Cooperage stock, Chicago..1.65c. to 1.70c.

Cold-Rolled Strips

F.o.b. Pittsburgh .....2.00c.
F.o.b. Cleveland .....2.00c.
Del'd Chicago .....2.30c.
F.o.b. Worcester .....2.20c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....2.90c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

(After Dec. 31, extras of 10c. a 100 lb. on mixed and joint carloads, 25c on pool carloads and 40c. on less than carloads will be applied on all merchant wire products.)

To Manufacturing Trade

Bright wire .....2.20c.
Spring wire .....3.20c.

To Jobbing Trade

Base per Keg

Standard wire nails.....$1.95
Smooth coated nails..... 1.95
Galvanized nails 3.95

Base per Lb.

Smooth annealed wire.....2.25c.
Smooth galvanized wire.....2.80c.
Polished staples .....2.50c.
Galvanized staples .....2.75c.
Barbed wire, galvanized.....2.60c.
Woven wire fence No. 9 gage, per net ton $55.00
Woven wire fence, No. 12½ gage and lighter, per net ton..... 60.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

STEEL PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Iron Inches	Iron Black	Iron Galv.
⅛	47	21½	¼ and ⅜	+9	+34
¼ to ⅜	53	27½	½	25	7
½	58	44½	¾ to 1	30	13
¾	62	50½	1 and 1¼	33	17
1 to 3	64	52½	1½ and 2	37	20

Lap Weld

2	57	45½	2	25	11
2½ to 6	61	49½	2½ to 3½	30	15
7 and 8	58	45½	4 to 6	32	19
9 and 10	56	43½	7 and 8	31	18
11 and 12	55	42½	9 to 12	28	13

Butt Weld, extra strong, plain ends

⅛	43	26½	¼ and ⅜	+11	+46
¼ to ⅜	49	32½	½	25	9
½	55	44½	¾	30	14
¾	60	49½	1 to 2	36	20
1 to 1½	62	51½			
2 to 3	63	52½			

Lap Weld, extra strong, plain ends

2	55	44½	2	31	15
2½ to 4	59	48½	2½ to 4	36	22
4½ to 6	58	47½	4½ to 6	35	21
7 to 8	54	41½	7 and 8	33	19
9 and 10	47	34½	9 to 12	23	10
11 and 12	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discounts of 5 and 2½% and on galvanized by 1½ points with supplementary discounts of 5 and 2½%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
		1¾ in.	8
2½ in.—2¾ in.	46	2 in.—2½ in.	13
3 in.	52	2½ in.—2¾ in.	18
3¼ in.—3¾ in.	51	3 in.	17
4 in.	57	3¼ in. to 3½ in.	18
4½ in. to 6 in.	46	4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	48
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages takes the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.50% base (carloads) 55
Carbon, 0.30% to 40% base 50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

Rails

Per Gross Ton

Standard, f.o.b. mill.....$43.00
Light (from billets), f.o.b. mill ... 32.00
Light (from rail steel, f.o.b. mill) ..... $28.00 to 30.00

Track Equipment

Base per 100 Lb.

Spikes, 9/16-in. and larger.....$2.60
Spikes, ⅜-in. and larger 2.60
Spikes, boat and barge 2.80
Tie plate, steel 1.85
Angle bars 2.75
Track bolts, to steam railroads..... 3.50
Track bolts, to jobbers, all sizes, per 100 count.....75 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

†Machine bolts 75
†Carriage bolts 75
Lag bolts 75
Plow bolts, Nos. 1, 2, 3 and 7 heads.. 75
Hot-pressed nuts, blank or tapped, square 75
Hot-pressed nuts, blank or tapped, hexagons 75
C.p.c. and t. square or hex. nuts, blank or tapped 75
Washers*...7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
†Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

Per Cent Off List

Semi-finished hexagon nuts 75
Semi-finished hexagon castellated nuts, S.A.E. 75
Stove bolts in packages, P'gh ..... 77½, 25 and 10
Stove bolts in packages, Chicago ..... 77½, 25 and 10
Stove bolts in pkgs., Cleveland, ... 77½, 25 and 10
Stove bolts in bulk, P'gh 86
Stove bolts in bulk, Chicago 86
Stove bolts in bulk, Cleveland 86
Tire bolts .....60 and 10

Discount of 75 per cent off on bolts and nuts applies on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

Base per Lb.

F.o.b. Pittsburgh or Cleveland.....$2.25
F.o.b. Chicago ..... 70, 10 and 5

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh .....70, 10 and 5
F.o.b. Cleveland .....70, 10 and 5
F.o.b. Chicago .....70, 10 and 5

Cap and Set Screws

Discounts to Jobbers

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List

Milled cap screws, 1 in. dia. and smaller .....80 and 25
Milled standard set screws, case hardened, 1 in. dia. and smaller ....75 and 10
Milled headless set screws, cut thread, ⅝ in. and smaller .....75 and 10
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller .....80, 25 and 10
Upset set screws, sq. head, 1 in. dia. and smaller .....75, 10 and 10
Upset set screws, 1⅛ in. and larger, ...75 and 10
Milled studs 70

SEMI-FINISHED STEEL

Billets and Blooms

Per Gross Ton

Rerolling, 4-in. and under 10-in., Pittsburgh $26.00
Rerolling, 4-in. and under 10-in., Youngstown 26.00
Rerolling, 4-in. and under 10-in., Cleveland 26.00
Rerolling, 4-in. and under 10-in., Chicago 29.00
Forging quality, Pittsburgh 33.00
Forging quality, Youngstown..... 33.00

Sheet Bars

(Open-Hearth or Bessemer)

Per Gross Ton

Pittsburgh $26.00
Youngstown 26.00
Cleveland 26.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

Per Gross Ton

Pittsburgh $26.00
Youngstown 26.00
Cleveland 26.00

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(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$37.00
Cleveland	37.00
Chicago	38.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.00 to $2.15
Foundry, f.o.b. Connellsville prompt	3.00 to 4.25
Foundry, by-product, Chicago ovens	7.00
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.35 to 8.75
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	7.82
Foundry, Birmingham	5.00
Foundry, by-products, St. Louis, f.o.b., ovens	8.00
Foundry, by-products, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.40 to $1.50
Mine run coking coal, f.o.b. W. Pa.	1.50 to 1.60
Gas coal, ¾-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	0.50 to 0.65
Gas slack, f.o.b. W. Pa. mines	0.50 to 0.65

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	2.65c.
No. 5 industrial fuel oil	2.45c.
Per Gal. f.o.b. Cleveland	
No. 3 industrial fuel oil	4.62½c.
No. 4 distillate	4.00c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-heat Duty Brick	Intermediate Duty Brick
Penn.	$35.00	$25.00 to $30.00
Maryland	35.00	25.00 to 30.00
New Jer.	$44.00 to 57.00	
Ohio	35.00	25.00 to 30.00
Kentucky	35.00	25.00 to 30.00
Missouri	35.00	30.00
Illinois	35.00	25.00 to 30.00
Ground fire clay, per ton	6.50	

Chrome Brick

	Per Net Ton
Standard size	$12.50

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$38.00
Chicago	47.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$61.50
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	38.50
Domestic, f.o.b. Chewelah, Wash.	20.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$34.40 to $38.40
4-in., del'd Chicago	37.40 to 41.40
6-in. and larger, del'd New York	28.20
4-in., del'd New York	31.20
6-in. and larger, Birm'ham	$32.00 to 33.00
4-in., Birmingham	35.00 to 36.00

Class "A" and gas pipe, $3 extra.

Pig Iron, Ores, Ferroalloys

VALLEY

Per gross ton, f.o.b. Valley furnace:

Basic	$13.50
Bessemer	15.00
Gray forge	14.50
No. 2 foundry	14.50
No. 3 foundry	14.00
Malleable	$14.50 to 15.00
Low phos., copper free	25.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$14.00
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.00
Bessemer	15.00

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnace:

N'th'n No. 2 fdy.	$15.50 to $16.00
N'th'n No. 1 fdy.	16.00 to 16.50
Malleable, not over 2.25 sil.	15.50 to 16.00
High phosphorous	15.50 to 16.00
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	16.14
Low phos., sil. 1 to 2, copper free	27.50
Silvery, sil. 8 per cent	23.67
Bess. ferrosil'n. 15 per cent	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
Northern No. 2 fdy., del'd St. Louis	$18.30 to 18.80
Southern No. 2 fdy. del'd	11.56
Northern malleable, del'd	18.50 to 18.80
Northern basic, deliv'd	18.30 to 18.80

Freight rates 83c. (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

Per gross ton, delivered New York district:

*Buffalo, No. 2, del'd east N. J.	$17.41 to $17.66
East Pa. No. 2 fdy.	15.52
East Pa. No. 2X fdy.	16.02

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

No. 2 fdy.	$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal, del'd	23.41

NEW ENGLAND

Per gross ton delivered to most New England points:

*Buffalo, sil. 1.75 to 2.25	$19.04 to $20.04
*Buffalo, sil. 2.25 to 2.75	19.04 to 20.04
†Buffalo, sil. 1.75 to 2.25	17.41 to 18.91
†Buffalo, sil. 2.25 to 2.75	17.41 to 18.91
*Ala., sil. 1.75 to 2.25	19.74
*Ala., sil. 2.25 to 2.75	20.24
†Ala., sil. 1.75 to 2.25	15.88
†Ala., sil. 2.25 to 2.75	16.28

Freight rates: $5.05 all rail from Buffalo, and $3.41 to $3.91 rail and water from Buffalo when $1 barge and $2 to $2.50 New England freight rate are obtainable; $9.75 all rail from Alabama and $5.88 rail and water from Alabama to New England seaboard.

*All-rail rate.

†Rail-and-water rate.

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$13.82
Ala. fdy., sil. 2.25 to 2.75	14.32
Tenn. fdy., sil. 1.75 to 2.25	15.82
N'th'n No. 2 foundry	$17.01 to 17.59
S'th'n Ohio silvery, 8%	21.02

Freight rates, $2.02 from Ironton and Jackson, Ohio; $3.82 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

East. Pa. No. 2	$14.34 to $14.84
East. Pa. No. 2X	14.84 to 15.34
East. Pa. No. 1X	15.34 to 15.84
Basic (del'd east. Pa.)	15.50
Malleable	17.50 to 18.00
Stand. low phos. (f.o.b. east. Pa. furnace)	21.00 to 22.00
Cop. b'r'g low phos. (f.o.b. furnace)	21.00 to 22.50
Va. No. 2 plain	21.54 to 22.04
Va. No. 2X	22.04 to 22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: $1c. to $1.79 from eastern Pennsylvania furnaces; $4.67 from Virginia furnaces.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	$15.50
S'th'n fdy. sil. 1.75 to 2.25	16.14
Malleable (local delivery)	15.50
Ohio silvery, 8 per cent	21.87
Stand. low phos., Valley	25.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 55c. average local switching charge; $3.12 from Jackson, Ohio; $6.14 from Birmingham.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:

No. 2 fdy., 1.75 to 2.25 sil.	$11.00
No. 2 soft, 2.25 to 2.75 sil.	11.50
Basic	11.00

CANADA

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	$23.00 to $23.50

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$68.00
Foreign, 80%, Atlantic or Gulf port, duty paid	68.00

Prices for lots of one carload or more; extras applied on less than carload lots.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$25.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (less carloads)	85.00
75% (carloads)	126.00
75% (less carloads)	136.00
14% to 16% (f.o.b.) Welland, Ont., in carloads)	31.00
14% o 16% (less carloads)	36.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$20.50	14%	$23.50
11%	21.00	15%	24.00
12%	21.50	16%	25.00
13%	22.50	17%	26.50

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$18.00	12%	$20.50
7%	18.50	13%	21.50
8%	18.75	14%	22.50
9%	19.00	15%	23.00
10%	19.50	16%	24.00
11%	20.00	17%	25.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	$1.08
Ferrotungsten, less carloads	$1.15 to 1.20
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr, delivered, in carloads	10.00c
Ferrochromium, 2% carbon	17.00c to 17.50c
Ferrochromium, 1% carbon	19.00c to 20.00c
Ferrochromium, 0.10% carbon	23.50c to 25.00c
Ferrochromium, 0.06% carbon	25.50c to 27.00c
Ferrovanadium, del., per lb. contained Va.	$3.05 to $3.30
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	68.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton	$91.00
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c. to 8.50c.
Iron, low phos., Swedish, average 68½% iron	9.00c.
Iron, basic or foundry, Swedish, average 65% iron	8.00c.
Iron, basic or foundry, Russian, aver. 63% iron (nom.)	9.00c.
Manganese, Caucasian, washed 52%	24.00c.
Manganese, African, Indian, 50-52%	23c. to 24c.
Manganese, Brazilian, 46 to 48%	21c. to 22c.

	Per Gross Ton
Tungsten, Chinese wolframite	$10.75 to $11.00
Tungsten, domestic scheelite	10.50 to 10.50
Chrome, 45% Cr_2O_3, crude, c.i.f. Atlantic seaboard	18.00
Chrome, 48% Cr_2O_3, c.i.f. Atlantic seaboard	20.00

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5, Kentucky and Illinois mines, freight allowed, Pittsburgh basis	$20.31
No. 2 lump, 85-5, Kentucky and Illinois mines, freight allowed, Pittsburgh basis	22.31
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00 to 17.40
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	32.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$8.00 to $8.50
No. 2 heavy melting steel	6.50 to 7.00
No. 2 railroad wrought	8.00 to 8.50
Scrap rails	8.00 to 8.50
Rails 3 ft. and under	10.50 to 11.00
Sheet bar crops, ordinary	8.00 to 8.50
Compressed sheet steel	7.50 to 8.00
Hand bundled sheet steel	6.50 to 7.00
Hvy. steel axle turnings	7.00 to 7.50
Machine shop turnings	5.00 to 5.50
Short shov. steel turnings	5.00 to 5.50
Short mixed borings and turnings	4.50 to 5.00
Cast iron borings	4.50 to 5.00
Cast iron carwheels	8.00 to 8.50
Heavy breakable cast	8.00 to 8.50
No. 1 cast	8.50 to 9.50
Railr. knuckles and couplers	8.50 to 9.00
Rail. coil and leaf springs	8.50 to 9.00
Rolled steel wheels	8.50 to 9.00
Low phos. billet crops	10.50 to 11.00
Low phos. sheet bar crops	10.50 to 11.00
Low phos. plate scrap	9.00 to 9.50
Low phos. punchings	9.00 to 9.50
Steel car axles	10.00 to 10.50

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$4.50 to $5.00
Shoveling steel	4.50 to 5.00
Frogs, switches and guards	4.50 to 5.00
Hydraulic comp. sheets	3.50 to 4.00
Drop forge flashings	3.00 to 3.50
No. 1 busheling	3.50 to 4.00
Rolled carwheels	6.50 to 7.00
Railroad tires	7.50 to 8.00
Railroad leaf springs	7.50 to 8.00
Axle turnings	4.00 to 4.50
Steel couplers and knuckles	5.50 to 6.00
Coil springs	7.50 to 8.00
Axle turnings (elec. fur.)	4.50 to 5.00
Low phos. punchings	7.00 to 7.50
Low phos. plates, 12 in. and under	6.50 to 7.00
Cast iron borings	2.00 to 2.50
Short shoveling turnings	2.00 to 2.50
Machine shop turnings	1.75 to 2.25
Rerolling rails	6.75 to 7.25
Steel rails, less than 3 ft.	7.50 to 8.00
Steel rails, less than 2 ft.	8.00 to 8.50
Angle bars, steel	6.50 to 7.00
Cast iron carwheels	5.50 to 6.00
Railroad malleable	5.00 to 5.50
Agricultural malleable	5.00 to 5.50
*Relaying rails, 56 to 60 lb.	15.00 to 17.00
*Relay rails, 65 lb. and up	18.00 to 23.00

	Per Net Ton
Iron angle and splice bars	$5.25 to $5.75
Iron arch bars, transoms	4.50 to 5.00
Iron car axles	10.50 to 11.00
Steel car axles	7.00 to 7.50
No. 1 railroad wrought	3.75 to 4.25
No. 2 railroad wrought	4.75 to 5.25
No. 1 busheling	3.00 to 3.50

No. 2 bushelling	$2.00 to	$2.50
Locomotive tires, smooth	7.50 to	8.50
Pipes and flues	2.50 to	3.00
No. 1 machinery cast	6.00 to	6.50
Clean automobile cast	6.25 to	6.75
No. 1 railroad cast	5.25 to	5.75
No. 1 agricultural cast	5.00 to	5.50
Stove plate	4.75 to	5.25
Grate bars	5.00 to	5.50
Brake shoes	5.50 to	6.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$6.00 to	$6.50
No. 2 heavy melting steel	4.50 to	5.00
No. 1 railroad wrought	7.00 to	7.50
Bundled sheets	4.00 to	4.50
Hydraulic compressed, new	4.50 to	5.00
Hydraulic compressed, old	4.00 to	4.50
Machine shop turnings	3.00 to	3.50
Heavy axle turnings	5.50 to	6.00
Cast borings (nom.)	3.00 to	3.50
Heavy breakable cast	7.50 to	8.00
Stove plate (steel works)	6.00 to	6.50
No. 1 low phos. heavy	9.50 to	10.00
Couplers and knuckles	6.50 to	7.00
Rolled steel wheels	6.50 to	7.00
No. 1 blast furnace (nom.)	3.00 to	3.50
Spec. iron and steel pipe	5.50 to	6.00
Shafting	10.00 to	11.00
Steel axles	13.50 to	14.00
No. 1 forge fire	5.50 to	6.00
Cast iron carwheels	8.00 to	8.50
No. 1 cast	8.00 to	8.50
Cast borings (chem.)	8.00 to	10.50
Steel rails for rolling	9.00 to	9.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$6.25 to	$6.75
No. 2 heavy melting steel	5.50 to	5.75
Compressed sheet steel	5.50 to	6.00
Light bundled sheet stampings	4.50 to	5.00
Drop forge flashings		5.00
Machine shop turnings	2.75 to	3.00
Short shoveling turnings	4.00 to	4.50
No. 1 busheling	5.00 to	5.50
Steel axle turnings	5.00 to	5.50
Low phos., billet crops	9.00 to	10.00
Cast iron borings	3.50 to	4.00
Mixed borings and short turnings	3.00 to	3.50
No. 2 busheling	3.00 to	3.50
No. 1 cast	6.50 to	7.00
Railroad grate bars	5.00 to	5.50
Stove plate	5.00 to	5.50
Rails under 3 ft.	8.50 to	9.00
Rails for rolling	8.50 to	9.00
Railroad malleable	7.25 to	7.50
Cast iron carwheels	7.00 to	7.50

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$6.50 to	$7.00
No. 2 heavy melting scrap		5.00
Scrap rails	6.75 to	7.25
New hydraul. comp. sheets		5.00
Old hydraul. comp. sheets		4.00
Drop forge flashings		5.00
No. 1 busheling		5.00
Hvy. steel axle turnings		6.00
Machine shop turnings	4.00 to	4.50
Knuckles and couplers		10.00
Coil and leaf springs		10.00
Rolled steel wheels		10.00
Low phos. billet crops	10.00 to	10.50
Short shov. steel turnings	5.50 to	6.00
Short mixed borings and turnings	3.75 to	4.25
Cast iron borings	3.75 to	4.25
No. 2 busheling	3.50 to	4.00
Steel car axles	10.00 to	11.00
Iron axles	10.00 to	11.00
No. 1 machinery cast	9.00 to	9.50
No. 1 cupola cast	8.25 to	8.75
Stove plate	7.25 to	7.50
Steel rails, 3 ft. and under	9.50 to	10.00
Cast iron carwheels	8.00 to	9.00
Industrial malleable	7.00 to	7.50
Railroad malleable	7.00 to	7.50
Chemical borings	7.50 to	8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$7.00 to	$7.50
Scrap steel rails	7.50 to	8.00
Short shoveling turnings		4.00
Stove plate		6.00
Steel axles		7.00
Iron axles		7.00
No. 1 railroad wrought	4.50 to	5.00
Rails for rolling	8.00 to	8.50
No. 1 cast		8.00
Tramcar wheels		8.00
Cast iron borings, chem		8.50

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$5.50 to	$6.00
No. 1 heavy melting	5.00 to	5.50
No. 2 heavy melting	4.50 to	5.00
No. 1 locomotive tires	4.75 to	5.25
Misc. stand-sec. rails	5.50 to	6.00
Railroad springs	6.50 to	7.00
Bundled sheets	2.75 to	3.25
No. 2 railroad wrought	4.50 to	5.00
No. 1 busheling	4.00 to	4.25
Cast iron borings and shoveling turnings	2.75 to	3.25
Iron rails	7.00 to	7.50
Rails for rolling	7.00 to	7.50
Machine shop turnings	2.50 to	3.00
Heavy turnings	3.75 to	4.25
Steel car axles	8.25 to	8.75
Iron car axles	12.50 to	13.00
Wrot. iron bars and trans.	5.00 to	5.50
No. 1 railroad wrought	3.50 to	4.00
Steel rails less than 3 ft.	8.50 to	9.00
Steel angle bars	6.00 to	6.50
Cast iron carwheels	5.00 to	5.50
No. 1 machinery cast	6.50 to	7.00
Railroad malleable	4.75 to	5.25
No. 1 railroad cast	5.75 to	6.25
Stove plate	5.50 to	6.00
Relay, rails, 60 lb. and under	16.00 to	16.50
Relay, rails, 70 lb. and over	20.00 to	21.00
Agricult. malleable	5.00 to	5.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$3.00
No. 2 heavy melting steel	1.50
Heavy melting steel (yard)	1.50
No. 1 hvy. breakable cast	$4.50 to 4.75
Stove plate (steel works)	2.25 to 2.75
Machine shop turnings	0.50 to 1.00
Short shoveling turnings	0.50 to 1.00
Cast borings	0.50 to 1.00
No. 1 blast furnace	0.50 to 1.00
Steel car axles	8.00 to 8.50
Iron car axles (nom.)	14.00 to 14.50
Spec. iron and steel pipe	2.00 to 2.50
Forge fire	3.25
No. 1 railroad wrought	4.00 to 4.50
No. 1 yard wrought, long	3.25 to 3.50
Rails for rolling	5.00 to 5.50
No. 1 cast	5.00 to 5.25
No. 2 cast	4.00 to 4.50
Stove plate (foundry)	3.25
Malleable cast (railroad)	3.50 to 4.00
Cast borings (chemical)	6.00 to 6.50

Per gross ton, delivered local foundries:

No. 1 machinery cast	$7.00 to	$7.50
No. 1 hvy. cast (cupola size)	7.00 to	7.50
No. 2 cast	4.00 to	4.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$3.35 to	$3.50
Scrap T rails		3.35
Machine shop turnings	0.80 to	1.00
Cast iron borings		1.05
Bundled skeleton, long	2.00 to	2.10
Forge flashings	3.00 to	3.50
Blast furnace scrap	0.90 to	1.00
Forge scrap	3.00 to	3.25
Shafting	9.50 to	10.00
Steel car axles	9.00 to	9.50
Wrought pipe	4.00 to	4.25
Rails for rolling	4.50 to	5.00
Cast iron borings, chemical	7.00 to	7.25

Per gross ton delivered consumers' yards:

Textile cast	$7.00 to	$7.50
No. 1 machinery cast	7.50 to	8.00
Stove plate	5.00 to	5.25
Railroad malleable	10.50 to	11.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$4.50 to	$5.00
Scrap rails for melting	6.00 to	6.50
Loose sheet clippings	1.00 to	1.50
Bundled sheets	3.25 to	3.75
Cast iron borings	2.75 to	3.25
Machine shop turnings	2.50 to	3.00
No. 1 busheling	3.75 to	4.25
No. 2 busheling	2.00 to	2.50
Rails for rolling	6.50 to	7.00
No. 1 locomotive tires	7.00 to	7.50
Short rails	8.00 to	8.50
Cast iron carwheels	6.00 to	6.50
No. 1 machinery cast	8.50 to	9.00
No. 1 railroad cast	7.50 to	8.00
Burnt cast	3.25 to	3.75
Stove plate	3.25 to	3.75
Agricultural malleable	7.00 to	7.50
Railroad malleable	7.50 to	8.00

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting steel	$4.25 to	$4.75
Borings and short turnings	1.50 to	2.00
Long turnings	1.00 to	1.50
No. 1 machinery cast	7.00 to	7.50
Automotive cast	8.50 to	9.00
Hydraul. comp. sheets	3.25 to	3.75
Stove plate	3.25 to	3.75
New No. 1 busheling	3.25 to	3.75
Old No. 2 busheling	1.25 to	1.75
Sheet clippings	1.25 to	1.75
Flashings	3.50 to	4.00

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	7.00	$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	12.50	10.00
Stove plate	10.00	8.00
Standard carwheels	1.00	8.50
Malleable	10.00	8.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	2.95c.
Squares and flats	3.45c.
Bands	2.95c.
Hoops	3.60c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.15c.
Galv. sheets (No. 24), 25 or more bundles	3.65c.
Hot-rolled sheets (No. 10)	3.10c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	$3.74
Spikes, large	2.50c.
Small	2.75c. to 2.90c.
Boat	3.00c.
Track bolts, all sizes, per 100 count, 70 per cent off list	
Machine bolts, 100 count, 70 per cent off list	
Carriage bolts, 100 count, 70 per cent off list	
Nuts, all styles, 100 count 70 per cent off list	
Large rivets, base per 100 lb.	$3.00
Wire, black, soft ann'l'd, base per 100 lb.	2.75
Wire, galv. soft, base per 100 lb.	3.20
Common wire nails, per keg	2.35
Cement coated nails, per keg	2.35

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforcing bars, billet steel	1.65c. to 1.75c.
Rail steel reinforcement	1.45c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.00c.
Flats and squares	3.50c.
Bands, $\frac{1}{4}$ in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 22)	3.55c.
Galv. sheets (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	3.20c.
Spikes ($\frac{1}{2}$ in. and lighter)	3.45c.
Track bolts	4.30c.
Rivets, structural	3.75c.
Rivets, boiler	3.75c.
	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Coach and lag screws	70
Hot-pressed nuts, sq., tap, or blank	70
Hot-pressed nuts, hex., tap, or blank	70
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

NEW YORK

	Base per Lb.
Plates and struc. shapes	2.70c. to 3.10c.
Soft steel bars, small shapes	2.70c. to 3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	6.00c. to 6.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.52c.
Flats and squares	4.02c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Hot-rolled sheets (No. 10)	3.00c. to 3.25c.
Hot-rolled ann'l'd sheets (No. 24*)	3.50c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	4.50c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel, $\frac{1}{2}$ x $\frac{1}{8}$ in. and larger, Smooth finish, 1 to 2½ x ¼ in. and larger	3.40c. 3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.
Common wire nails, base, per keg	$2.60

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
¾ x 20 in. and smaller	65 to 65 and 10
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.31c.
Hot-rolled annealed sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Hot-rolled sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	3.85c.
Galv. corrug. sheets	4.40c.
Structural rivets	4.00c.
Boiler rivets	4.00c.
	Per Cent Off List
Tank rivets, $\frac{7}{8}$ in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	70
Carriage bolts	70
Lag screws	70
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	70
Less than 200 lb.	60
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	70
Less than 200 lb.	60

PHILADELPHIA

	Base per Lb.
Plates, ¼-in. and heavier	2.45c.
Structural shapes	2.45c.
Soft steel bars, small shapes, iron bars (except bands)	2.45c.
Reinforc. steel bars, sq., twisted and deform.	2.30c.
Cold-fin. steel, rounds and hex.	3.35c.
Cold-fin. steel, sq. and flats	3.85c.
Steel hoops	3.00c.
Steel bands, No. 12 to 3/16-in., incl.	2.75c.
Spring steel	5.00c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galvanized sheets (No. 24)	3.75c.
Hot-rolled and annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, ⅛ in.	5.00c.
Swedish iron bars	5.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 1.95c.
Cold-fin. rounds and hex.	2.95c.
Cold-fin. flats and sq.	3.45c.
Hoops and bands, No. 12 to $\frac{1}{16}$ in., inclusive	3.00c.
Hoops and bands, No. 13 and lighter	3.55c.
Cold-finished strip	*5.55c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galvanized sheets (No. 24)	3.75c.
Hot-rolled sheets (No. 10)	3.00c.
Black ann'l'd wire, per 100 lb.	$2.75
No. 9 galv. wire, per 100 lb.	3.20
Com. wire nails, base per keg	2.35

*Net base, including boxing and cutting to length.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rails steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.20c.
Cold-fin. rounds and hex.	3.20c.
Squares	3.75c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	4.25c.
Hot rolled sheets (No. 10)	3.30c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb.	10.25
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$17.50
4-in.	36.00
Lap-welded steel boiler tubes, 2-in.	16.50
4-in.	34.50

BUFFALO

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.65c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex.	3.15c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.10c.
Bands	3.35c.
Hoops	3.90c.
Hot-rolled sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$2.46
Black wire, base per 100 lb.	3.20

BOSTON

	Base per Lb.
Plates	*3.35c.
Structural shapes	*3.35c.
Soft steel bars, small shapes	*3.25c.
Reinforcing bars	3.10c. to 3.25c.
Iron bars—	
Refined	3.25c.
Best refined	4.60c.
Spring steel, open-hearth	5.00c.
Tire steel	4.50c. to 4.75c.
Bands	*3.75c. to 4.25c.
Hoop steel	4.90c. to 5.40c.
Cold-rolled steel—	
Rounds and hex.	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Rivets, structural or boiler	4.80c.
	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Lag screws	70
Hot-pressed nuts	40 and 10
Cold-punched nuts	40 and 10
Stove bolts	70 and 10

*Base price (250 to 999 lb.); less than 250 lb., add 50c. per 100 lb.; 1000 to 7999 lb., deduct 15c.; 8000 to 14,999 lb., deduct 25c.; 15,000 lb. and larger lots, deduct 35c.

PACIFIC COAST

	Base Per Lb. San Francisco	Los Angeles	Seattle
Plates and struc. shapes, ¾-in. and heavier	3.25c.	3.30c.	3.00c.
Soft steel bars	3.25c.	3.30c.	3.00c.
Reinforcing bars	3.00c.	3.00c.	3.00c.
Hot-rolled annealed sheets (No. 24)	3.95c.	4.20c.	4.50c.
Hot-rolled sheets (No. 10)	3.50c.	3.50c.	4.00c.
Galv. sheets (No. 24)	4.55c.	4.50c.	5.00c.
Struc. rivets, ½ in. and larger, less than 1000 lb.	5.00c.	5.00c.	6.00c.
Cold-finished steel Rounds	5.50c.	5.50c.	4.50c.
Squares and hexagons	6.75c.	6.75c.	5.75c.
Flats	7.25c.	7.25c.	6.75c.
Common wire nails, base per keg in less carloads	$2.90	$2.90	$2.85 to 3.00

Plates, shapes, bars, bands and hot rolled sheets, No. 16 gage and heavier, subject to reductions for quantity. Cold-finished quotations based on 100 lb. minimum quantity.

British Government Continues Iron and Steel Duties

Tariffs to Be Maintained for at Least Three Months After July 25—Continental Prices Lower

LONDON, ENGLAND, July 4 (*By Cable*).—The British Government is continuing for three months from July 25 the existing 33⅓ per cent duties on iron and steel excepting band saw steel, strip over 4 in. wide and from 19 to 12 gage which are duty free from July 8. A new duty of 2s. per gross ton is effective as of July 8 on all imported safety razor blades and blanks, this new levy being an addition to the existing 20 per cent duty. The advisory committee on tariffs has recommended that no alteration be made in this duty for five years.

Markets are quiet, being affected by the fact that this is a seasonal period for reduced activity. Holidays this year are likely to be prolonged.

Continental gold prices have eased on continuance of the uncertainties as to the outcome of the Lausanne and Geneva conferences. Increased competition, especially from the French mills, is also a factor in lower prices.

The German Gutehoffsnungshutte has closed the Oberhausen Works for 10 days. The Belgian Chatelineau shut down on July 1 for an indefinite period.

Welsh tin plate demand is improving and prices are stiffening up to 15s. base f.o.b., nearest ports. Some sellers are now asking 15s. 6d. and over. Production is now running about 55 to 60 per cent.

Excessive quota claims of the French controlled Polish Hute Bankowa are holding up definite renewal of the Polish Iron Works Syndicate.

Russian pig iron output in May was 554,000 metric tons; steel ingot production was 498,000 tons, and rolled steel output was 360,000 tons.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9 0s.	
Billets, open hearth	4 17 6d	to £5 7s. 6d
Black sheets, Japanese specifications	9 12 6	
Tin plate, per base box	15 0	to 15 6
Steel bars, open-hearth	7 17½	to 8 7½
Beams, open-hearth	7 7½	to 7 17½
Channels, open-hearth	7 12½	to 8 2½
Angles, open-hearth	7 7½	to 7 17½
Black sheets, No. 24 gage	8 0	to 8 10
Galvanized sheets, No. 24 gage	9 5	to 9 7 6

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at $4.86

Billets, Thomas	£4 18s.
Wire rods, No. 5 B.W.G.	4 10
Black sheets, No. 31 gage, Japanese	11 5
Steel bars, merchant	2 2
Beams, Thomas	2 1 6d
Angles, Thomas, 4-in. and larger	2 1
Angles, small	2 3
Hoops and strip steel over 6-in. base	3 5
Wire, plain, No. 8	5 7½
Wire, barbed, 4-pt., No. 10 B.W.G.	8 15

Attacks on Steel Prices

(*Concluded from page* 19)

in steel prices since 1929, which it gives as follows:

Percentage of Reduction Since 1929

Base: Pittsburgh

Product	*Per Cent of Decline*
Bars	17.9
Tanks plates	17.9
Structural shapes	17.9
Cold-finished bars	26.1
Hot-rolled strips	26.3
Cold-rolled strips	29.8
Autobody sheets	30.5
Hot-rolled annealed sheets, No. 24	22.8
Sheets, galvanized, No. 24	20.8
Hot-rolled sheets, No. 10	29.5
Wire nails	26.4
Plain wire	12.0
Barbed wire, galvanized	21.2

"That this wholesale reduction in the average price of steel commodities, amounting to from $3.50 to $30 a ton below the 1910-1913 period accounts for the losses shown in the statements of various steel companies is incontrovertible," says the association, which asserts also that its studies "establish the indisputable conclusion that steel prices cannot be maintained on this level without causing dangerous financial embarrassment to the steel industry, a condition bordering upon destitution for those employed in it and the dangerous growth of propaganda and doctrines with which the established order is being assailed today."

Says Long Price Decline Contributes to Present Distress

In a personal statement, Mr. Charls says that "the long and unrelenting decline in steel prices that started in 1923 reveals the underlying cause of the present distress in the great basic steel industry. In a period when all the world is in a desperate, frustrated state of mind, when formulisms and theories are proving more and more wrong, and less and less right; when truly practical economists, charged with the responsibility of finding an answer, are most cautious in their conclusions; when the leaders in industry are anxiously gaging the least degree of rise and fall in the barometer of trends and doing their best to give some sort of employment to all their men; when the facts, and the facts alone, can prevail; does it not behoove each and every thoughtful buyer and seller to seek and know these facts and apply them not only to his particular problem, but to the problem of all, as his contribution to the solution of a national economic dilemma?"

Although not specifically so stated, the bulletin of the National Association of Flat Rolled Steel Manufacturers appears as a refutation of the recent bulletin of the Alexander Hamilton Institute on the subject of "Steel Prices," which was also answered in THE IRON AGE of June 23, p. 1358, in an article by C. E. Wright, markets and news editor.

Canada Plans to Buy More British Steel

MONTREAL, QUE., July 2.—Conferences between representatives of the Canadian and British steel industries will open here on July 5. The British industrialists have just reached Canada and are making a tour of the steel plants in the East. No definite program has been drawn up.

Executives of Canadian steel companies stated that it is the intention to discuss possibilities of a mutual increase in trade. As present tariffs are wide in scope and the British preference runs as high as 50 per cent of the general tariff, the Canadian delegates believe these possibilities exist, not only in the primary steel and iron products, but in manufactured articles, which come under the iron and steel classification.

Data are being prepared regarding Canada's iron and steel imports from foreign countries. It is felt that a great deal of the iron and steel now imported from the United States because British rolling mill standards are not similar to those used in Canadian construction work might be diverted to Great Britain after some study and new arrangements.

It is understood that representatives of the following companies will participate in the conference: Steel Co. of Canada, Ltd.; Algoma Steel Corpn.; Dominion Steel & Coal Corpn.; Dominion Foundries & Steel, Ltd.; Canadian Tube & Steel Products, Ltd.; Dominion Wire Rope Co.; Anglo-Canadian Wire Rope Co., and others.

Russia—An Attractive Market for American Products

(*Concluded from page* 1)

evitably be made. These reports have drifted to America—some true and some false—but most of them are magnified in the telling. The Soviet Union has quickly realized most of its errors in industrial management and has applied corrective measures without unduly compromising its individualistic system of government. In fact, the opinion of American business men regarding the success of the Soviet program is rapidly changing. At first, we were frankly pessimistic; now, because it has endured, and the evidence is visible in the form of vast industrial plants which are operating successfully, a more confident feeling has taken root.

It would not be fair to compare the present standards existing in U. S. S. R. with those in America. In the United States, our industrial era began around 1890. Give the Soviet Union 42 years of such experience and then we can compare her industrial progress with ours. If any one wishes to make an immediate comparison, he should compare conditions as they are in Russia now with the conditions existing in the Russia of the pre-war times. Naturally, the future of the Soviet Government depends upon its ability to construct and operate these new plants economically. Her industrial experiment is not merely a plaything—it is vital to the life of the Government—and we must keep in mind that Russia has exercised considerable sagacity by coming to America and employing many of our capable engineers to help coach her industrial workers and plan her manufacturing facilities.

In purchasing abroad, the terms of credit usually asked by the Soviet Union are from 18 to 30 months for complete payment, depending upon the product—this credit dating from shipment. It is readily accepted by the leading European manufacturers. Why does Russia ask for such liberal credit arrangements? Many Americans believe it is to postpone the day of reckoning. However, the tremendous extent of the five-year program must again be taken into consideration. If it involved only the development of a single industry, such as steel, or power, or mining, the need for such extended credit might not be necessary. Russia is moving forward industrially on all fronts. Her widespread advance takes on such colossal proportions that clearly it cannot be handled by short term credits.

The Soviet plan may appear to some as a gigantic purchasing bubble, which may some day explode, leaving countless unsatisfied creditors dangling in mid-air. A thoughtful review of the thorough planning of the Soviet is beneficial. All purchases are synchronized with anticipated revenues; the severest measures of economy have been practiced and only products which are indispensable to progress are purchased; stress is laid on the successful operation of the manufacturing industries and a systematic course of training in scientific plant operation and management has been established.

The most remarkable aspect of all this gigantic pool of purchases is that it has been conducted without the slightest suspicion of graft. An organized government, consecrated to its task and not a mere rabble, is in the saddle. Probably the world has never seen such a determined effort to stamp out the insidious things which have gnawed at the vitals of government for ages. Graft of any kind—large or small—may be punishable by death. This is an important confidence-building factor which is helping to stabilize Russian credit.

The willingness of Europe to do business with Russia—much of it on money loaned by America—should awaken American industry to the opportunities which are slipping through its fingers. Europe, because of its nearness, is much more familiar with the real state of affairs, and has shown more courage in its dealings with the Soviet and, consequently, has reaped greater benefits.

The attitude here is one of impasse. Russian buying effort has been largely withdrawn from the United States. Her engineers have gone to other countries. The "vacated" sign is up. American business cannot hope to share in the Soviet Union purchases unless it frankly and interestedly meets the terms extended by other countries.

The Reconstruction Finance Corporation was installed as a protective measure for American business. It has done great work plugging up the leaks, which were undermining American financial foundations at home. It has stopped unwarranted bank failures, safeguarded the insurance companies and brought a certain stability to frozen credits.

But that is only half of the job to be done. Now it must get to its work of rehabilitating industry. America needs the stimulant of foreign buying. Putting all our effort solely on the upbuilding of domestic business, when our buying power has already been sapped by unemployment, is like trying to lift one's self by his own bootstraps. It cannot be done successfully, no matter how much we strain or sweat. Some method of acceptance or discounting Soviet purchases by the Reconstruction Finance Corporation might, at one stroke of the pen, put into operation a financial arrangement which would permit American manufacturers, employing American labor, to do what European countries are doing largely on capital borrowed from America.

If the provisions of the Reconstruction Finance Corporation cannot permit the discounting of foreign drafts, it may perhaps be possible to arrange a mid-way instrumentality between American manufacturers and the Finance Corporation to satisfactorily solve the problem.

Russia must also be given an opportunity to market her products. Without a fair exchange, she cannot continue to buy from a country which is supplying her with machines and other raw materials. Furthermore, an opportunity must be provided to market some of her raw materials which are indispensable to our industrial life. In considering this, we should not be led astray by any unconfirmed reports having a bearing on the political situation of the Soviet Union.

It does not take a great deal of business acumen to see why we should make it possible for America to do business with Russia. If we do not, we will continue to see the other nations building up their industry and giving work to their people while we sit idly by.

The Russian situation is clearing—no question about it. This vast country, rich in natural resources, with one hundred and sixty million people whose average standards of living can be compared to our own hardy pioneers' lives a hundred years ago, has needs which must be filled. It is only natural, too, that these wants will expand as the masses get their first real taste of the modern conveniences of life. Vast rich areas are being conquered for the benefit of the masses, and are beginning to yield a harvest which can be exchanged for other products. Russia today is a land rediscovered.

Representing at present the world's greatest and most virile market, Soviet Russia's wants are spread like a banquet before the hungry commerce of the world.

Sales Control Plan of Coal Trade To Be Tested in Supreme Court

WASHINGTON, July 5.—Whether units of an industry have the legal right to make a uniform contract with a corporation making it the exclusive agency for the sale and distribution of their product will be determined at a relatively early date by the Supreme Court of the United States if plans of the Department of Justice and coal operators in the Southern Appalachian field materialize.

A formal move to this end was instituted on Wednesday of last week when the Department of Justice filed injunction proceedings in the United States District Court at Lynchburg, Va., against 136 bituminous coal mining companies charging them with entering into a combination and conspiracy in violation of the Sherman anti-trust act. The department proposes to file an "expediting petition" asking that the case be transferred from the jurisdiction of the Federal District Court to a Federal Circuit Court, thus eliminating the usual preliminary proceedings before the lower court. The hearing likely will start in August before three judges who will select the place at which the case will be heard. It is hoped to bring the case before the Supreme Court by January. These plans have been mutually agreed upon by the department and the coal interests.

The suit centers around the so-called corporation known as Appalachian Coals, Inc. It is made up of coal operators in Kentucky, Tennessee, Virginia and West Virginia, and, according to the department's petition, they represent upward of 70 per cent of the production in this area. The department charges that each of the defendants has made a uniform contract with Appalachian Coals, Inc., by which it is made the exclusive agency for the sale and distribution of coal mined by the defendants and that it will apportion orders among them on a quota basis agreed upon. The corporation, it is declared, also will have full charge and control of all matters of distribution and prices. Each defendant is said to have subscribed to the stock of the corporation on the basis of his production and 17 of the 136 defendants, the petition claims, will have a majority control.

The plan is said to have been devised at meetings called by the National Coal Association and, if put into effect, according to the department, would restrain and monopolize the trade. It is alleged that the coal operators have agreed that this is to be done by a cessation of independent and competitive action among themselves in the trade and by controlling and regulating the supply, distribution and prices of bituminous coal produced and sold by them. The charge is further made that the defendants have an understanding with groups in other regions that similar plans to control and regulate the business will be applied there, if the court shall fail to enjoin the movement in the Appalachian field.

Urges Use of Domestic Steel in Public Works

Urging the exclusive use of American steel in public projects to be authorized in the pending relief bill in Congress, the American Institute of Steel Construction, 200 Madison Avenue, New York, has sent the following bulletin to its members:

Legislation to be enacted in the closing hour of Congress will provide for an extended program of public buildings and self-liquidating projects, such as bridges, tunnels, etc. This measure is enacted for the relief of unemployment by providing construction work as well as a market for construction materials.

If foreign building materials, particularly those that may be imported at prices below the cost of production, are to be used, the purpose of the legislation may be very largely defeated. Every ton of foreign steel that is used displaces American workmen in our mills and incurs a loss to our transportation systems and railway labor. American rolling mills and American labor should receive first consideration during this period of business depression.

We suggest to the members of the structural steel industry, including their voting employees, if they feel so inclined, that they write their representatives in Congress and urge them to demand restrictive measures to prevent the use of foreign materials and particularly steel in the proposed public construction program.

The National Committee on Trade Recovery, sponsored by the Construction League of the United States, has been organized with chairmen appointed in all the States. Every detail has been completed for an intensive drive to locate possibilities and to speed up the placement of contracts. The leaders in States, counties and municipalities must be educated to recognize the economic need of local projects, once adequate credit is placed at their disposal by the Reconstruction Finance Corpn.

This drive should be of interest to the structural steel industry, as large tonnages of steel will undoubtedly be used in the work that will result. If those who are interested or those who would be willing to cooperate with us in this undertaking would send us their names, it would be helpful to us. Immediate action is necessary.

American steel produced by American workmen for American structures to be paid for with American money, is a worthwhile slogan at this time, if the public works program is to accomplish all that is expected of it.

Canadian Steel Output Dropped Further in May

Production of steel ingots and steel castings in Canada in May dropped 19 per cent below the April output. May pig iron production was also lower than in the preceding month, while output of ferroalloys in May was 48 per cent less than in April. May production figures in gross tons and comparisons follow:

	May, 1932	*April*, 1932	*May*, 1931
Pig iron	13,333	16,898	50,511
Steel ingots and direct steel castings	29,239	36,030	75,235
Ferroalloys	1,132	2,185	2,540

102 Ships Now Under Construction in U. S.

WASHINGTON, July 5.—There were 102 vessels of 186,411 gross tons under construction in American yards in June compared with 79 of 172,977 gross tons in the previous month, according to an announcement by Commissioner Arthur J. Tyrer of the Bureau of Navigation.

U. S. Motor Car Output 185,149 Units in May

WASHINGTON, July 5.—The production of motor vehicles in the United States in May rose to 185,149 from 148,326 in April and consisted of 157,683 passenger cars, 27,393 trucks and 73 taxicabs. Output in the first five months of the current year totaled 689,192 motor vehicles, against 1,322,295 in the corresponding period of last year. Canadian production in May was 8221 units as against 6810 in April.

Magnetism and Stresses

Texture of the surface of a sheet of rolled steel is different from that at the center of the sheet, says Dr. Francis Bitter, research physicist of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. This is due to the peculiarly distributed stresses immediately under the rolls, he says, and explains that the phenomenon is partly responsible for the fact that the outside layer of a rolled sample has different magnetic properties from the core.

Steel Castings Orders at Low Point

WASHINGTON, July 5.—Orders for commercial steel castings in May totaled 11,340 tons, or 7.7 per cent of the 130 establishments reporting to the Bureau of the Census. April orders were 12,801 tons. Orders in the first five months of the current year were 75,088 tons and compare with 220,405 tons booked in the corresponding period of last year. The output in May was 14,457 tons, as against 17,474 tons in April. In the first five months of 1932, production aggregated 89,610 tons and in the corresponding period of last year it was 244,033 tons.

New Steel Floor Slab Fabricated from Sheets

According to a research report published by Dr. J. H. Young, extensive scientific investigation and development, carried out cooperatively by Mellon Institute of Industrial Research and the H. H. Robertson Co., Pittsburgh, has created a new steel floor slab, called the Robertson keystone-beam steel floor.

This floor slab, 24 in. wide and up to 12 ft. 5 in. in length, as built at present, is fabricated by preforming two steel sheets and subsequently welding them together in the plane above the neutral axis. A cross-section taken through the width of a completed unit shows four keystone-shaped cells, all connected together near the neutral axis. This design is said to provide maximum load-carrying efficiency of the metal. It is reported that the high strength factors, combined with the relatively low weight per square foot, make possible savings in building construction because of the decreased load-carrying requirements for floor slabs, columns, and foundations. The four ducts that constitute each unit are spaced at 6-in. intervals and connect directly, when installed, with the corresponding ducts of the adjacent section of floor slab.

Doctor Young states that this arrangement enables the utilization of this new floor not only as a load-carrying members but also as a multiple floor-duct system for handling all types of electrical lines. He points out that such a grouping of parallel cells with 6-in. spacing permits, at any subsequent time, the installation of electrical outlets within a radius of 3 in. from the exact location required, thus affording great electrical flexibility and precluding the likelihood of electrical obsolescence.

It is claimed that the installation of the keystone slab can be accomplished with ease and rapidity, owing to the fact that it may be handled as readily as a large plank. This 24-in. slab is laid across the structural beams and then bolted, clipped, or welded to the supporting members, thus eliminating planking and form work with the immediate placement of a floor on which the various trades may work. This floor, which plays a dual role in furnishing maximum efficiency from a load-carrying standpoint and in assuring permanent electrical flexibility, is incombustible and fire-safe; it is also adaptable to appropriate finishes and to suspended ceilings and service piping, and has a low weight per square foot, together with physical properties which may be either large or small.

Economic Conferences Focus Attention

(Concluded from page 21)

other will be joint action between the Bank of England and the Federal Reserve Banks to arrest deflation and to foster a moderate credit expansion.

France will probably refuse to join in the latter type of cooperative program because French economic opinion is philosophically opposed to the view that monetary policy governs the price level.

The Outlook

The 1932 siege of conferences, already in fact under way, promises to occupy the time and attention of officials during the remainder of the current year. It is very uncertain whether these conferences will untangle the network of world economic problems, for the simple reason that direct facing of hard realities across nationalistic lines is so difficult to achieve.

At Geneva some nations are trying to urge disarmament on others who are not possessed of a sufficient sense of security.

At Lausanne, reparations are in process of being labeled as ended, but this does not dispose of the basic European political rivalry and particularly it does not tempt the American people to regard favorably a cancellation of war debts.

At Ottawa, preliminary steps may be taken toward determining the radius of sterling and trade agreements may be completed, but the prospect is not for definite and final determination of world issues.

At London, everything is too vague and uncertain to permit a tangible outlook. At the moment, no specific, clear-cut program exists.

Consequently, the observer has to hope that these various conferences will come to closer grips with stark reality before the opportunity has been lost.

Gray Iron Output Higher in May

The Gray Iron Institute reports that production of gray iron castings by its members gained in May three points over that in April, the average for all districts having been 39.8 per cent last month as against 36.8 per cent in April. New business, however, declined, having been 30.3 per cent of normal in May as compared with 44.6 per cent in April. Unfilled orders at the end of May were 25.5 per cent of normal as against 32.5 per cent at the end of the preceding month.

The greatest activity is in the Central Atlantic area, comprising the States of Pennsylvania, Michigan, Ohio and Indiana, and in the area south and west to the Mississippi River. Class "C" plants, or those having a production of 251 to 400 tons per month, are establishing the best records.

Eighteen members reported the business outlook as fair, 38 regarded it as poor and 40 described it as bad.

The Gray Iron Institute derives its normal base as the average monthly production during the last three calendar years.

Alloy Cements for Hard Metal Carbides

(Concluded from page 9)

steel mold as usual, and then sintered in hydrogen at 900 deg. C. ½ hr.; 1000 to 1500 deg. 1½ hr.; 1500 deg. 1½ hr. Hardness, 85.0. The toughness was appreciably higher than that of Alloy No. 19 A.

It is difficult to get quantitative data on relative toughness of these hard alloys, but actual service tests of prepared tools or "bits" gave us a very good idea of the superiority of the alloy cemented as compared with the pure metal cemented carbides. Results are summarized in the table:

Summarization of Results

Alloy No.	Composition Per Cent	Cement	Max. Sint. Deg. C.	Rock-well	Quality
1	11.5 Co; 88.5 W	Co	1500	85.5	Brittle
2	11.5 Co; 88.5 W	Co	1400	85.2	Brittle
3a	5.0 Co; 95.0 W	Co	1420	86.5	Brittle
3b	5.0 Co; 95.0 W	Co	1520	86.7	Brittle
6	5.0 Co; 95.0 W	Co	1470	87.1	Brittle
16a	5.25 Co; 94.75 WC	Co=W=C	1470	86.6	Very tough
16b	5.25 Co; 94.75 WC	Co=W=C	1500	86.8 / 87.3	Tough
17a	4.22 Co; 1.5 Mo; 94.28 WC	Co=W=C=Mo	1450	87.0	Very tough
17b	4.22 Co; 1.5 Mo; 94.28 WC	Co=W=C=Mo	1500	86.8	Tough
19a	2.1 Co=Mo; 97.9 Co=W=C	Co=Mo	1500	87.2	Tough
19b	2.1 Co=Mo; 97.9 Co=W=C	Co=Mo=Cu	1500	85.0	Very tough

PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Trade Almost Stagnant

Seasonal Influences Accentuate Inertia Among Buyers—Many Plants Idle

MACHINE tool markets, in common with almost all forms of metal-working business, have slumped into virtual stagnation. Seasonal influences have accentuated the inertia that has existed among buyers for some time. Inquiries have declined to the vanishing point, and companies which have been considering the purchase of new tools have generally postponed commitments until the late summer or early fall. It is not likely that the machine tool situation will show any marked change for the better until there are definite indications of a turn in the tide as affecting the business situation as a whole.

Many machine tool plants have been completely idle or approaching such a condition for some weeks, so that the extended holiday shutdowns that have occurred are no surprise. Some tool plants are keeping only sufficient working forces to get out repair orders and are able to take care of such orders as may come in for tools from stocks that have been built up in the effort to give employment to some of their men.

NORTH ATLANTIC

Fidelio Brewery, Inc., New York, recently organized to take over brewing and soft drink manufacturing plant of Norman S. Goldberger, First Avenue, Twenty-ninth to Thirtieth Street, is planning expansion, including installation of automatic bottling, capping, conveying and other equipment. Cost over $400,000 with machinery. Company is arranging fund of about $1,000,000 for program and other operations.

Department of Mental Hygiene, State Office Building, Albany, N. Y., asks bids until July 13 for automatic combustion control equipment, boiler equipment, etc., for Manhattan State Hospital, Wards Island, N. Y.

New Rochelle Roofing, Cornice & Skylight Works, Inc., New Rochelle, N. Y., has been organized by Barnard and Sidney Davidson, 40 Harrison Street, to manufacture metal building products.

Department of Correction, State Office Building, Albany, N. Y., asks bids until July 12 for power equipment for replacements in power house at Westfield State Farm, Bedford Hills, N. Y.

Teco Mfg. Corpn., New York, has been organized by Ruliff J. Fisher, 69 Maples Road, Brookline, Mass., and Walter E. Lippert, 356 Hewlett Parkway, Hewlett, N. Y., to manufacture radio, electrical and mechanical equipment. Company will be affiliated with Teleradio Engineering Corpn., 484-90 Broome Street.

Brooklyn & Queens Transit Corpn., 385 Flatbush Avenue, Brooklyn, has plans for one-story mechanical and car-washing plant, 25 x 195 ft. Cost over $35,000 with equipment. H. J. Kolb, company engineer, address noted.

Charles Miller & Co., Secaucus Road, North Bergen, N. J., meat packers, have asked bids on general contract for one-story tank house. Cost over $30,000 with equipment. Otto S. Schlich, 136 Liberty Street, New York, is architect and engineer.

Campbell's Lubricant Co., 351 Verona Avenue, Newark, N. J., manufacturer of oils and other lubricants for automotive service, is carrying out expansion, including installation of additional equipment. Company has recently secured large contract, totaling close to $5,000,000 a year.

Murray Auto Body Works, Inc., Newark, has been organized, capital $100,000, to take over and expand company of same name at 113 South Street, manufacturer of commercial and other automobile bodies.

Raritan Copper Works, Elm and Market Streets, Perth Amboy, N. J., is considering rebuilding power plant, recently destroyed by fire. Cost over $25,000 with equipment.

Electrons, Inc., 692 South Sixteenth Street, Newark, manufacturer of rectifier units for radio service, etc., has developed full time production schedule with close to normal working force.

Derf Mfg. Co., Newark, care of William J. Jaeger, 790 Broad Street, has been organized by Phillips M. Goodwin, Newark, and associates to manufacture automobile parts and other mechanical equipment.

W. J. Bush & Co., Stiles Street, Linden, N. J., manufacturer of oil products, has awarded general contract to William D. Sherman, 286 North Broad Street, Elizabeth, N. J., for one-story and basement addition, 50 x 120 ft. Cost over $35,000 with equipment. H. B. Brady, Inc., 233 North Broad Street, Elizabeth, is architect.

J. J. Hockenjos Co., 829 Broad Street, Newark, manufacturer of paints, varnishes, etc., has rejected bids recently received for a three-story and basement factory, 60 x 200 ft., and will ask new bids later. Cost close to $65,000 with equipment. Henry D. Scudder, Jr., 9 Clinton Street, is architect.

Crossley Machine Co., State and Monmouth Streets, Trenton, N. J., manufacturer of clay-working machinery, parts, etc., has resumed full time operations following curtailment of several months.

Supply Officer, Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until July 13 for two 5-ton geared trolleys and two spur gear hoists (Req. 5015-2368 NSAF. General contract has been let to Haverstick-Borthwick Co., Schaff Building, for new dynamo meter and control building at local factory at $22,435, exclusive of equipment.

Wilmar Mfg. Co., 331 North Lawrence Street, Philadelphia, manufacturer of food products, plans new four-story factory to double present capacity. Cost over $85,000 with machinery.

Eastern Specialties Corpn., Scranton, Pa., has been organized by William E. Bright and Alexander McCulloch, Scranton, to manufacture machinery and tools, machined metal parts, etc.

Giles & Ransome, 231 North Twelfth Street, Philadelphia, contractors' machinery and equipment, have leased one and one-half story building for new storage and distributing plant.

Board of Education, Wilmington, Del., plans manual training department in new David W. Harlan public school, for which general contract just let to Cantera Construction Co., 1504 Pennsylvania Avenue. Cost about $400,000.

Freihofer Baking Co., Twentieth Street and Indiana Avenue, Philadelphia, has asked bids on general contract for two and one-half story plant at Allentown, Pa., to replace unit recently destroyed by fire. Will include boiler plant, traveling ovens, conveying and other machinery. Cost about $400,000. Austin Co., Philadelphia, is architect and engineer.

Watson Holding Corpn., Jamestown, N. Y., recently organized, has purchased plant and assets of Watson Mfg. Co., 2100 Taylor Street, manufacturer of metal furniture, steel and bronze bank fixtures, etc., for $393,500, from receivers. Plans are under way for reorganization of former company, headed by John E. Durkin, president, and William W. Watson, former president.

Board of Education, City Hall, Buffalo, asks bids until July 12 for electric motor and starter, vacuum valves and other equipment. James Storer is secretary.

American Radiator Co., Buffalo, has resumed production at Bond plant, following curtailment of over two months, giving employment to about 250 men. Output will be concentrated largely on boilers. Company has recently transferred its Pierce plant to Bond works.

Star Brush Mfg. Co., manufacturer of paint and varnish brushes, Long Island City, N. Y., has effected a financial reorganization with a final payment to creditors under an agreement entered into in 1928. Alexander Schumann continues as president.

CENTRAL DISTRICT

Wilkinsburg School District, High School Building, Wallace Avenue, Wilkinsburg, Pa., L. R. Hagan, secretary, asks bids until July 18 for one electric mixing machine.

Meister Coal Co., Martins Ferry, Ohio, plans rebuilding power plant recently destroyed by fire.

Sands Mfg. Co., 5407 Sweeney Avenue, Cleveland, manufacturer of gas water heaters, is advancing operations at plant. Company has secured contract from Government for 1250 large automatic heater units.

Board of City Commissioners, Piqua, Ohio, asks bids until July 20 for equipment for municipal electric light and power plant, including traveling crane, electric pumping machinery, coal-handling equipment, switchboard and accessory equipment, and electric distributing system. Bids will be asked on general contract in August. Appropriation of $700,000 has been made for entire project. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is engineer.

Auto-Forgings, Inc., Sandusky, Ohio, has been organized by Perry Catron and E. F. Emmons, Edgewater Avenue, capital $100,000, to manufacture forgings and kindred iron and steel products for automotive service.

Village Councils, Rocky River, Bay View and Fairview, Ohio, care of William Rogers, Ulmer Building, Cleveland, County sanitary engineer, plans installation of pumping machinery, power, conveying and other mechanical equipment in new joint sewage disposal plant. Bond issue is being arranged. Cost about $165,000 with machinery.

Ira Petersime & Son, Gettysburg, Ohio, manufacturer of electric incubators, electric ovens, etc., plans rebuilding part of plant, recently destroyed by fire. Loss about $45,000 with equipment.

Dayton Rubber Mfg. Co., Dayton, Ohio, manufacturer of automobile tires, etc., is running on capacity schedule. Shipments in June

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TORONTO, CANADA
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LYMAN TUBE & SUPPLY CO., LTD.

VANCOUVER, CANADA
LYMAN TUBE & SUPPLY CO., LTD.

"There is a Distributor in your vicinity"

were largest in history of company, being about 48 per cent over those for August, 1978, previous record month.

Hughes Provision Co., 3199 West Sixty-fifth Street, Cleveland, food packer, has awarded general contract to Arthur Thomas, 2431 South Eighty-third Street, for two-story addition, 35 x 75 ft. Cost about $50,000 with equipment. H. M. Morse Co., Sloan Building, is architect.

State Department of Public Welfare, Third and Oak Streets, Columbus, Ohio, John McSweeney, director, will take bids soon for new boilers and accessory equipment for power house at prison farm, London, Ohio.

East Side Iron Elevator Co., Toledo, has been organized by George A. France and W. A. Boardman, capital $200,000, to take over and expand company of same name at 760 Miami Street.

Goodyear Tire & Rubber Co., Akron, Ohio, has let general contract to Frankenburg Construction Co., 8 East Long Street, Cleveland, for one-story factory branch and service building at Cleveland. Cost about $45,000 with equipment.

Lubricating Oils Co., 1940 East Sixth Street, Cleveland, has been organized by M. B. Vilas and M. T. Gordon, to establish an oil processing and refining plant.

State Board of Education, Indianapolis, has asked bids on general contract for one-story machine shop, 41 x 61 ft., at school at Claremont, near Indianapolis. O. N. Mueller, Indiana Trust Building, Indianapolis, is State consulting engineer.

City Council, Crown Point, Ind., will have plans completed for a municipal electric light and power plant. Project has been authorized.

Western Products, Inc., Newcastle, Ind., has been organized by Clem J. Stetler and Robert C. Steffen, Newcastle, to manufacture metal products, automobile equipment, etc.

Board of Public Works, Berne, Ind., plans installation of pumping machinery, tanks, conveying and other equipment in proposed new municipal disposal plant. Cost about $35,000. Charles Brossman, Chamber of Commerce Building, Indianapolis, is consulting engineer.

Titan Electric Co., Adrian, Mich., manufacturer of electric motors and parts, has taken over a factory at Hillsdale, Mich., and will remove at once to new location, where capacity will be increased. Frank Roberts is head.

Wilcox-Gay Corpn., Charlotte, Mich., has been organized by Chester M. Wilcox, Charlotte, and associates, to manufacture radio and television equipment and parts.

Kelvinator Corpn., 14250 Plymouth Street, Detroit, manufacturer of electric refrigerators, is planning immediate production of a line of new oil burners and oil-burning equipment, and will give over part of plant to this output, with increased working force.

Besser Mfg. Co., Alpena, Mich., manufacturer of concrete machinery, concrete mixers, etc., plans one-story addition. It is expected to have plans completed in about 60 days.

Sterling Motor Truck Co., West Allis, Wis., manufacturer of heavy-duty motor trucks, has acquired motor truck division of LaFrance-Republic Sales Corpn., Alma, Mich., specializing in production of light and medium capacity motor trucks. Purchasing company will keep acquired interest in operation, continuing in same line of motor truck output.

McLaughlin Ventilator Co., Ferndale, Mich., has been organized by Allen McLaughlin, 832 West Breckenridge Avenue, and associates, to manufacture ventilators and ventilating equipment.

Gibson Refrigerator Co., Greenville, Mich., manufacturer of electric refrigerators, etc., is running on a capacity schedule at local plant and branch factory at Belding, Mich., giving employment to about 800 men at both plants.

Packard Motor Car Co., 1580 East Grand Boulevard, Detroit, has begun expansion program at branch plant at Windsor, Ont., to include new axle manufacturing and body-building departments.

Water Sanding Disc Co., Detroit, recently organized to manufacture grinding, boring and abrasive products, will take over and expand company of same name at 712 Twenty-fifth Street. L. C. Moss is one of principals.

Keystone Steel & Wire Co., Peoria, Ill., has acquired Mattson Wire & Mfg. Co., Joliet, Ill. Name of acquired company will be retained and plant will continue production of snow, ornamental and poultry fences. Capital stock will be increased to $100,000.

SOUTH CENTRAL

Jefferson County Board of Commissioners, Birmingham, will soon take bids for new sewage disposal plant at Bessemer, Ala., including pumping machinery, settling and disgesting tanks and other equipment. Cost over $200,000. Plans are under way for similar plant at Ensley, Ala., to cost about like amount. J. C. Rogers, Birmingham, is County engineer.

City Council, Paris, Ky., is considering early call for bids for a municipal electric light and power plant. Cost close to $150,000 with equipment.

Capital City Machine Co., 600 North Court Street, Montgomery, Ala., plans rebuilding part of plant recently destroyed by fire. Portion of building was occupied by works of C. L. Beale Welding Co., also destroyed. Total loss about $40,000 with equipment.

Texas Oil Co., Houston, Tex., plans erection of oil storage and distributing plant at Anchorage, near Baton Rouge, La., on Mississippi River, in connection with new pipe line, including battery of tanks, pumping plant and other equipment. Cost over $70,000, exclusive of pipe line.

Economy Tool & Mfg. Co., Memphis, Tenn., has been organized by C. E. Cole, 158 North Willett Street, and associates, to manufacture tools and mechanical equipment.

Board of Trustees, Dillard Memorial University, Gentilly Avenue, New Orleans, plans erection of power plant in connection with new group of buildings. Entire cost over $200,000. Moise H. Goldstein, American Bank Building, is architect.

SOUTHWEST

Dri-Ice Refrigeration & Service Co., Kansas City, Kan., care of R. S. McGuire, 1533 Grand Avenue, Kansas City, Mo., head, has selected site at Kansas Avenue and Nineteenth Street for new dry ice (carbon dioxide) manufacturing plant. Cost over $100,000 with machinery. It is proposed to install a crane.

Shell Petroleum Corpn., Shell Building, St. Louis, has adopted six-hour shift at oil refinery at Roxana, Ill., increasing working force from 600 to 800 men.

Board of Education, Leavenworth, Kan., plans manual training department in new junior high school, for which bids are being asked on general contract until July 11. Cost over $250,000. Feth & Hazelwood, Leavenworth, Kan., and Felt, Dunham & Kriehn, 300 West Forty-seventh Street, Kansas City, Mo., are associated architects.

Poteau Mfg. Co., Poteau, Okla., recently organized by C. R. Prunty, Poteau, and associates, to manufacture vulcanizing irons and kindred equipment, gasoline tanks, etc., has leased local building and will equip at once.

Laclede Gas Light Co., 1017 Olive Street, St. Louis, is arranging program for use of natural gas from Arkansas and Louisiana oilfields, replacing artificial gas, and will install domestic and other equipment for new service in distributing district. Equipment will cost about $100,000.

Union Consumers' Oil Co., Blackwell, Okla., T. J. Volz, vice-president, has plans for bulk oil storage and distributing plant at Arkansas City, Kan.

Gilbert Brass Foundry, St. Louis, has been organized by Charles F. Gilbert, Jr., and associates to take over and succeed to A. Gilbert & Sons Brass Foundry Co., 4015 Forest Park Boulevard, manufacturer of brass and other metal castings.

Oklahoma Gas & Electric Co., 321 North Harvey Street, Oklahoma City, Okla., has acquired city transmission and distributing lines at Paden, Okla., and plans extensions and improvements in system.

Southwest Pump Co., Bonham, Tex., manufacturer of gasoline pumps, air compressors, etc., plans rebuilding part of plant recently destroyed by fire.

Producers Petroleum Co., Oklahoma City, Okla., has acquired 4500-acre tract of oil lands near Appleton, Tex., heretofore held by Vaughn Oil Co., and plans development, with installation of drilling, storage, distributing and other equipment.

Harry A. Wagenfuehr, secretary, New Braunfels Textile Mills, New Braunfels, Tex., and president, New Braunfels Chamber of Commerce, is organizing company to build a woolen mill, to include power house, pumping plant and other mechanical units. Tract of 10 acres is being acquired near Comal and Guadalupe Rivers. Main building will be three-stories, 64 x 412 ft. Entire project will cost $300,000 with machinery. New Braunfels Chamber of Commerce is interested in project.

Board of Regents, University of Texas, Austin, Tex., asks bids until July 15 for power equipment, including boiler, superheater, air preheater, combustion control equipment, fuel preparation equipment, ash equipment and accessories. Carl J. Eckhardt, Jr., is superintendent of power plants.

MIDDLE WEST

Signal Corps, Procurement District, 1819 West Pershing Road, Chicago, asks bids until July 12 for quantity of dry batteries (Circular 67).

Eagle Foundry Co., Belleville, Ill., manufacturer of metal castings, has arranged for increase in capital from $100,000 to $200,000 for expansion.

Common Council, Hutchinson, Minn., is considering erection of a municipal electric light and power plant. Cost over $125,000 with equipment. D. A. Adams is city clerk.

Great Northern Railway Co., St. Paul, Minn., has adopted full time working schedule at local car repair shops, adding about 200 men to force, increasing quota to over 1750 men at shops.

Conrad Refining Co., Conrad, Mont., is considering rebuilding part of oil refinery recently destroyed by fire. Loss close to $100,000 with equipment.

State Highway Department, Denver, Charles D. Vail, State highway engineer, has secured fund of $198,431 for purchase of road-building machinery and equipment.

A. B. F. Corpn., 1714 North Park Avenue, Chicago, has been organized by W. A. Ginsberg and associates, to manufacture machinery and other mechanical equipment.

City Council, Colorado Springs, Colo., has authorized plans for a new municipal steam plant. Cost over $50,000 with equipment. C. Truman St. Clair, Ferguson Building, is architect.

Department of Public Works, City Hall, Duluth, Minn., Emil Gustafson, commissioner, plans installation of electric-operated pumping machinery and other mechanical equipment in new chlorination plant for sewer system. Tract of 34 acres has been purchased. Cost about $200,000 with machinery. John Wilson is city engineer.

Board of Public Works, City Hall, St. Paul, Clyde R. May, commissioner, has plans for new power plant at McCarron pumping station. Cost about $75,000 with equipment. William N. Carey is city engineer.

National Wire Products Co., 232 West Sherman Street, Peoria, Ill., has been organized to manufacture wire goods, automobile accessories, etc. Clarence J. White and Herman S. Heilman, Peoria, are heads.

City Council, Grand Junction, Iowa, asks bids until July 12 for two Diesel engines, electric generators and auxiliary equipment for municipal electric light and power plant; entire station to cost about $85,000 with machinery. G. J. Long, Webster City, Iowa, is consulting engineer. O. V. Blaylock is city clerk.

City Council, Morris, Minn., is considering report by Robert J. Torrens, Shubert Building, St. Paul, consulting engineer, for erection of a municipal electric light and power plant. Cost about $150,000 with equipment.

Construction Machinery Co., Waterloo, Iowa, has been reorganized for manufacture of concrete mixers, pumps, plaster and mortar mixers and power saw rings. P. L. Bryant is president; L. S. Holden, secretary and general manager; T. A. Toenjes, factory manager, and H. R. McDermott, chief engineer.

NEW ENGLAND

Fitzgerald Mfg. Co., Main Street, Torrington, Conn., manufacturer of electrical appliances and equipment, is organizing a subsidiary to operate in Canada. Plant will be established at Toronto.

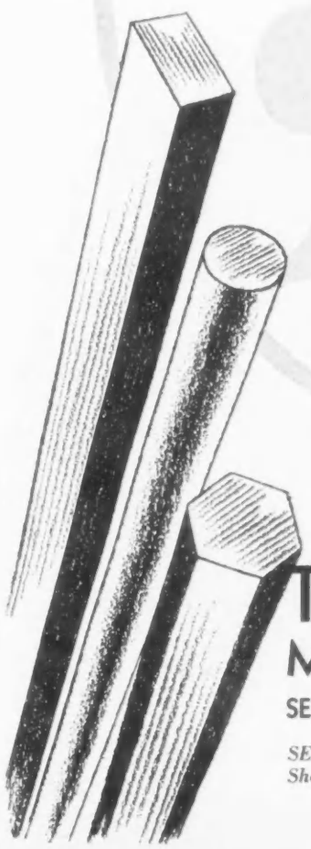
General Stapling Machine Co., Worcester, Mass., has been organized by Axel W. Carlson and Herman Stake, 34 Southbridge Street, to manufacture stapling machines and kindred equipment.

Board of Education, East Providence, R. I., is considering installation of manual training equipment in addition to high school at Broad-

SEYMOUR PHOSPHOR BRONZE

ESPECIALLY today when false economy born of panic is making the purchasing of materials more and more of a speculation, the staunch integrity and steadfastly maintained high quality of Seymour Products provide a lighthouse in the fog.

The many orders from fabricators who use Seymour Phosphor Bronze exclusively in their products are an overwhelming tribute of their confidence. Constant care and rigid inspection insure absolute uniformity of Phosphor Bronze Sheets, Wire and Rods that are accurate to specifications and worthy of incorporation into the finest products made.



The SEYMOUR MANUFACTURING CO.

SEYMOUR 1878-1932 CONNECTICUT

SEYMOUR NICKEL SILVER and PHOSPHOR BRONZE
Sheets—Wire—Rods—Also Nickel Anodes—Cast or Rolled

way and Taunton Avenue. Cost about $175,000. William R. Walker & Son, Providence, R. I., are architects.

Water and Sewerage Board, Town Hall, Swampscott, Mass., has plans for a new pumping plant. W. Pratt, Town Hall, is town engineer.

National India Rubber Co., Bristol, R. I., has arranged for increase in capital from $1,500,000 to $3,000,000 for expansion. Company will take over plant of United States Rubber Co., New York, with which it is affiliated, at Providence, R. I.

S. D. Warren Co., 89 Broad Street, Boston, manufacturer of paper, is planning to rebuild storage and distributing plant at Cumberland Mills, Me., recently destroyed by fire. Cost about $35,000 with equipment.

New England Metal Products Co., Boston, has been organized by Louis J. Maney and Peter P. Porter, 30 Pemberton Square, capital $50,000, to manufacture metal goods.

SOUTH ATLANTIC

Construction Service, Veterans' Administration, Washington, asks bids until July 19 for addition to refrigerating plant, Perry Point, Md.

Board of Directors, St. Mary's Industrial School for Boys, Wilkens Avenue, Baltimore, has awarded general contract to Mullan Contracting Co., 3945 Greenmount Avenue, for one-story addition, 46 x 76 ft.

United States Engineer Office, Jacksonville, Fla., asks bids until July 13 for suction and discharge pipe castings, flag valve and suction head (Circular 576).

Indian River Fruit Products, Inc., Wiley Avenue, Titusville, Fla., is considering addition to plant for canning service. Cost over $65,000 with equipment.

United States Engineer Office, Huntington, W. Va., asks bids until July 30 for new roller top type dam across Big Kanawha River, about nine miles from Charleston, W. Va., including four main roller gates and auxiliary equipment.

Southern Mineral Products Corpn., Piney River, Nelson County, Va., a subsidiary of Vanadium Corpn. of America, 120 Broadway, New York, has resumed operations at local phosphate division works, following curtailment for several weeks.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 12 for 12 electric arc welding sets (Schedule 8331) for Brooklyn and Norfolk navy yards, 82 fuel pumps for Philadelphia Navy Yard (Schedule 8355), 1700 resistors each for Brooklyn and Mare Island navy yards (Schedule 8351); until July 19 for four motor-driven bench type sensitive drills (Schedule 8325), four armature electric baking ovens and spare parts (Schedule 8328) for Brooklyn, Philadelphia, Mare Island and Puget Sound navy yards; rotary oil pumps and spare parts (Schedule 8348), four bench coil winding machines (Schedule 8327), four grinders and buffers (Schedule 8326), all motor driven, for Eastern and Western yards; until July 26, bus transfer auxiliary lighting and power equipment (Schedule 8323) for Brooklyn, Philadelphia, Mare Island and Puget Sound navy yards.

W. V. Rawls & Co., Bankers' Trust Building, Norfolk, Va., have leased a building at Suffolk, Va., for manufacture of radio equipment, including receiving sets.

General Purchasing Officer, Panama Canal, Washington, asks bids until July 19 for quantity of steel springs, metal flag poles, insulated cable, paint drums, wire mesh window guards, water meters and other equipment (Schedule 2770).

FOREIGN

Mather & Platt, Ltd., Manchester, England, manufacturer of canning machinery, parts, etc., and Food Machinery Corpn., San Jose, Cal., manufacturer of kindred equipment, have organized joint subsidiary under name of Food Machinery (M. & P.) Ltd., for production and sale of canning machinery and equipment in British Empire, exclusive of Canada and Australia, and in Continental Europe, exclusive of Russia. New company will utilize plant facilities of first noted organization at Manchester.

Soviet Russian Government, Moscow, is arranging for construction of several aluminum plants, including extension of present mill at Volkhov, expansion of plant at Dnieper, erection of six new aluminum works at Bobriky, Rion, Cheliabinsk, Sulak, Povenetz and Krasnoyarsk, respectively. Plans are also under way for alumina clay plants, including mining, refining and distributing units at Tikhvin, Alapaev, Gandzha, Khibinogorsk and other points. Entire project to cost over 85,000,000 rubles (about $42,500,000). A new brake lining and asbestos manufacturing plant will be built under technical advice and supervision of Multibestos Co., Walpole, Mass. Amtorg Trading Corpn., 261 Fifth Avenue, New York, is official buying agency.

PACIFIC COAST

Standard Oil Co. of California, 605 West Tenth Street, Los Angeles, plans erection of a new absorption plant at its Middle Dome oil properties, near Hanford, Cal. Cost over $70,000 with equipment.

City Purchasing Agent, Thomas Oughten, City Hall, Los Angeles, asks bids until Aug. 2 for two steam-generating units (price on each separately) with auxiliary equipment for new municipal electric light and power plant in Wilmington district (Specifications 2826), oil circuit breakers (Specifications 2830), transformers and accessories (Specifications 2829), metal-clad switchgear, etc. (Specifications 2833), for Water and Power Bureau.

Ford Motor Co. has advanced production schedule at Long Beach, Cal., assembling works. Plant is running on both new eight and four-cylinder cars, as well as commercial cars.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 12 for one cylinder grinding machine (Schedule 8342) for San Diego Navy Yard; until July 19 for 24,300 ft. pneumatic tool hose (Schedule 8336), 37,350 one-gal. capacity tin cans (Schedule 8339) for Mare Island Navy Yard; three flat steel railroad cars and one steel box car (Schedule 8332) for Sunnyvale Naval Base.

Herschel D. Mitchell and A. W. Johnson, Oroville, Wash., have applied for permission to appropriate water from Similkameen River for hydroelectric power purposes. It is proposed to build power dam 38 ft. high and 125 ft. long, generating station, 2000-ft. pipe line for water supply, to develop capacity of 3200 hp. Cost about $300,000 with transmission system.

Cornelius Aircraft Corpn., Los Angeles, care of Clive W. Johnson, 237 Winston Street, has been organized by Mr. Johnson and G. Wilbur Cornelius, to manufacture airplanes and parts.

Board of Trustees, California Institute of Technology, 1201 East California Street, Pasadena, Cal., has asked bids on general contract for two-story science building, 81 x 178 ft., to include machine rooms, grinding and polishing departments, laboratory and other units for optical glass and precision work. Cost about $175,000 with equipment.

New Trade Publications

Screws and Nails.—Parker-Kalon Corpn., 200 Varick Street, New York. Illustrated booklet presents information and technical data relating to the use and application of various types of screws and nails.

Flexible Couplings.—Diamond Chain & Mfg. Co., Indianapolis. Catalog 11 points out construction features, illustrates types and sizes and contains data covering selection and installation of the company's flexible couplings. Various types of drives with loads up to 700 hp. are shown.

Refractratories.—E. J. Lavino & Co., Philadelphia. Bulletin 1-21-1 describes Wetkrome, a chrome ore preparation in the form of a plastic, ready mixed chrome cement, suggested for bonding dead burnt magnesite, dolomite or ground chrome ore.

Conveyor Belts.—Diamond Rubber Co., Inc., Akron, Ohio. Application of belt conveyors in 27 industries is pictorially presented in catalog, with considerable text devoted to construction details, economies and advantages of belt conveyors.

Motors.—Wagner Electric Corpn., St. Louis. Bulletin 174, 22 pages, describes seven types of squirrel-cage motors, gives application tables, speed-torque curves and construction details.

Aluminum Alloys.—Aluminum Co. of America, Pittsburgh. Illustrated 63-page booklet presents concise information concerning physical and chemical properties of aluminum alloys produced by the company. It also contains tables of sizes of basic commodities manufactured from these alloys. Commercial tolerances for various commodities are also given.

Steel Sheets.—American Sheet & Tin Plate Co., Pittsburgh. Extensive use and wide adaptation of sheet metals in modern building construction are pictorially presented in 24-page booklet which contains many illustrations of prominent structures. Major applications cited include heating, ventilating and air-conditioning systems.

Sewage Sludge Reduction Equipment.—Stedman's Foundry & Machine Works, Aurora, Ind. Bulletin 130 reviews necessity for proper and economical disposition of sewage sludge. Application, construction and advantages of the company's equipment are described and illustrated. Actual operating cost data are also given.

Jet Condensers.—Pennsylvania Pump & Compressor Co., Easton, Pa. Bulletin 411 contains descriptive text and illustrations covering Byer jet condensers and auxiliaries for vacuum processes, produced by the company and marketed by Byer Engineering Associates, 75 West Street, New York.

Furnace Pressure-Control Systems.—Ryan, Scully & Co., Philadelphia. Circular describes issuance of patent covering system of furnace pressure control, with its particular advantages in the metal-working industry.

Ingot Iron.—American Rolling Mill Co., Middletown, Ohio. Bulletin illustrates application of ingot iron to certain outstanding buildings for heating and air-conditioning.

Stokers.—Whiting Corpn., Harvey, Ill. Construction features and advantages of the company's stoker are described in 16-page booklet.

Sheets and Plates.—Worth Steel Co., Claymont, Del. Two folders, one devoted to sheared steel plates produced in widths up to 150 in. and the other to blue annealed sheets, which are available in gages from No. 8 to No. 16, in widths up to 66 in., and lengths up to 156 in.

Heat and Acid Resisting Castings.—Standard Alloy Co., Inc., Cleveland. Bulletin No. 21, illustrated, describes the heat and acid resisting castings made by the company "up to a standard, not down to a price."

Stainless and Rustless Steel.—American Stainless Steel Co., Pittsburgh. "Forward with Stainless" is the title of a 34-page pamphlet which presents with attractive illustrations the advantages of this product to many lines of industry.

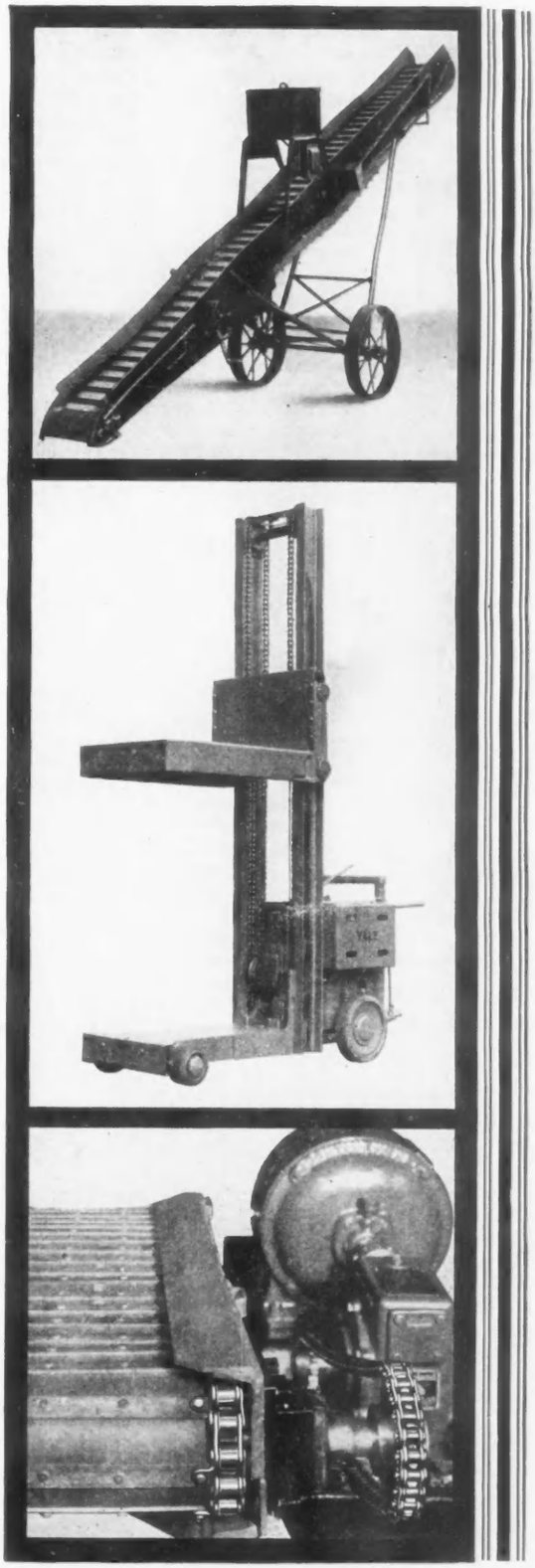
Fractional Electric Motors.—Wagner Electric Corpn., St. Louis. Loose-leaf bulletin on capacitor motors, which run as single-phase motors but have special starting torque capabilities. Brief sketch of the history of the development is included.

Arc Welders.—Harnischfeger Corpn., Milwaukee. Bulletin entitled "The Novice Understands and the Expert Appreciates" describing the construction and operation of the P & H—Hansen arc welder. A feature stressed is the so-called "internal stabilizer," claimed to eliminate weight and extra equipment and to assure uniform current flow, with increased efficiency of the arc. Capacities range from 100 to 800 amp.

Compressors.—Norwalk Co., Inc., South Norwalk, Conn. Catalog No. 36, 24 pages, devoted to multi-stage high-pressure air and gas compressors, standard and special service types. The four-stage machines are built for pressures from 2000 to 5000 lb. per sq. in.

F. W. Bowman Co., Long Beach, Cal., has been organized by W. J. Bowman, 1625 East First Street, and associates, to take over and expand machine works at 1219 Cherry Avenue, heretofore operated in name of F. W. Bowman, specializing in repair and parts production for oilfield equipment.

Shreveport Properties, Inc., Shreveport, La., has acquired the W. K. Henderson Iron Works & Supply Co., at that place.



Specify Chain Drives by Whitney

Wherever heavy loads and continuous service conditions have to be met, WHITNEY Roller Chain Drives can be depended upon to give constant and efficient power. Coal conveyors, hoists, factory lift trucks, tractors — on these and on hundreds of other equally exacting applications the extra strength and life of WHITNEY Roller Chains prove their value.

It takes a combination of proper design, careful manufacture and the use of correct steels to give these lasting qualities. Even though your machines may work under ideal conditions, they need dependable, long lived power drives.

WHITNEY Engineers will gladly work with you on your power transmission problems without obligation.

Write for Catalog V-95C WHITNEY Steel Roller Chain.

THE WHITNEY MFG. CO. Hartford, Conn.

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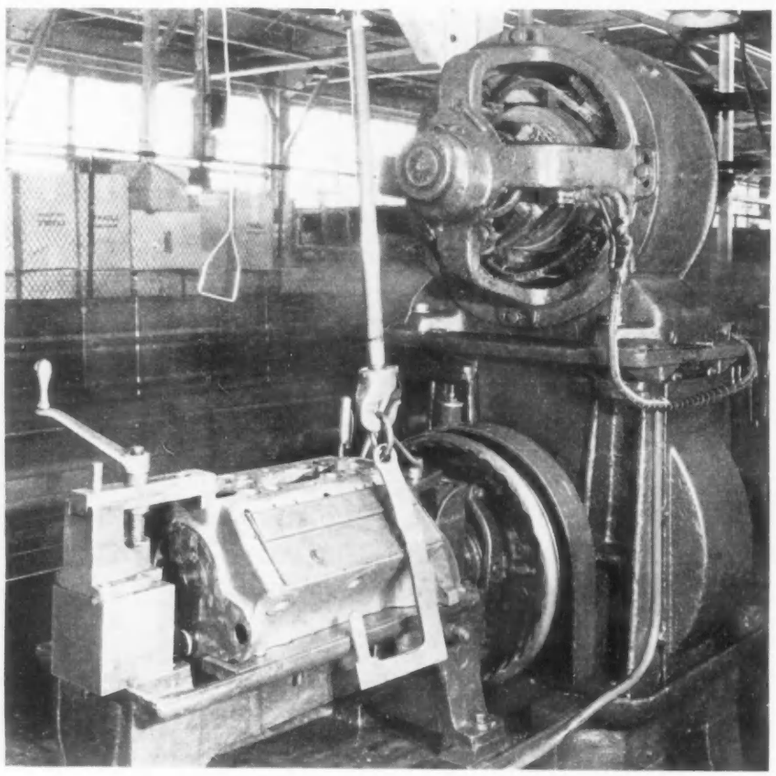
Agents in Principal Cities

WHITNEY SILENT AND ROLLER CHAIN DRIVES

FOR POSITIVE POWER TRANSMISSION

Valve Bushings and Motor Assembly of the Ford V-8

(*Concluded from page 5*)



Main bearings are burnished on a Ford-designed running-in stand operated by a 40-hp., 775 r.p.m. motor.

ator sets the cradle in motion, turning the block into such position that the valve seats on the other bank can be cut. The cradle, in reality, is a trunnion indexing fixture which makes it possible to complete all valve seats in one clamping. There is a special pilot guided in the valve guide and push rod holes and resting on a bar assembled in the camshaft hole to govern the depth of the seats cut by the special adjustable cutters. The head is designed specially to insure correct centering of the valve stems.

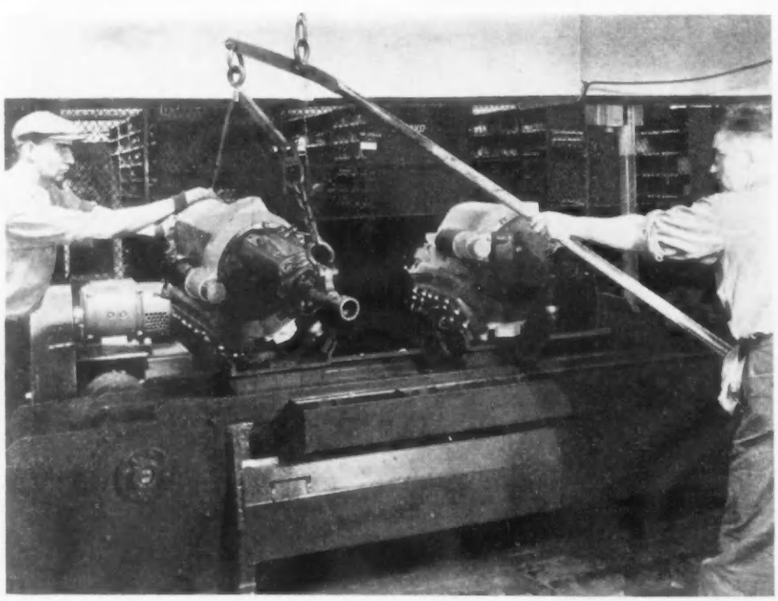
One of the most spectacular machining operations on the cylinder block is the boring of the main bearing on a special hydraulic boring lathe. Taking the block from the roller conveyor the operator slides it upside down into a special fixture which lifts it by hydraulic pressure of 100 lb. per sq. in. up to the cutting bar which locates in the center of the main bearings. The operator then puts the main bearing caps and the pins in the main bearing bolt holes in place, after which he turns on hydraulic pressure by a lever at his right, pushing the pins down and holding the caps in position.

He next shuts the door of the machine and starts the feed, the 6-ft. horizontal boring bar traveling back and forth. After the bearings are rough bored, the machine automatically adjusts the finishing cutter to the proper position and finish cuts the bearings. After the machining cycle is completed, the operator opens the door, releases the hydraulic pressure on the caps and lets down the fixture containing the block. The main bearing caps used in this operation are kept with the cylinder block all along the assembly line. A soda water solution is used as both lubricant and coolant for the boring work, keeping chips out from between the boring bar and the bearings.

To clean out the oil lines the cylinder block moves on buggies on a drag chain conveyor through a Ford-designed washing machine with approximately 100 sprays on either side which can be turned on the block at any angle. The water for this cleaning process is pumped by a centrifugal pump operated by a 30-hp. motor at 1750 r.p.m. Equipment includes an extra pump and motor of similar capacities for use during a breakdown. The washing solution is cleaned after it is used by passing through a clean filter tank which removes chips and material of a fibrous nature. The filtering process makes it satisfactory to use the cleaning water again without danger of plugging up the nozzles in the washer. The filter is motor-driven and equipped with speed reducer so that the filter cartridge is kept in continuous rotation and therefore is being cleaned out constantly.

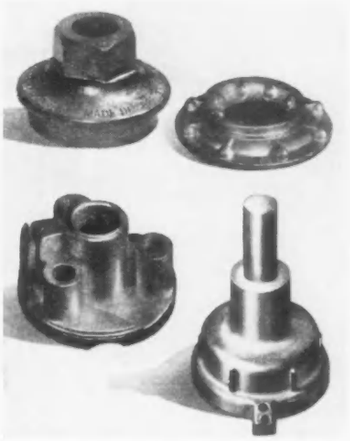
For the grinding of the valves in the cylinder block a machine with a cradle fixture similar to the one on the seating machine is employed. The machine is equipped with eight spindles each of which can be run independently of the others. The end of the grinding spindles are rubber-tipped so that they will adhere firmly to the top of the valves prior to the

(*Concluded on advertising page 22*)

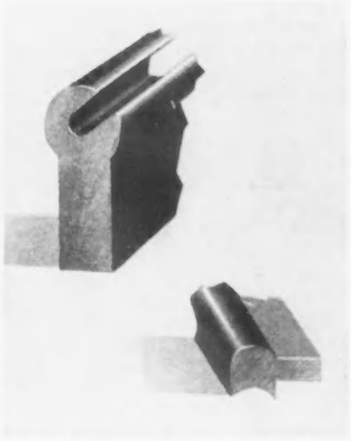


Two men handle 550 motors per 8 hr. at the end of the motor assembly line by means of a hand-operated hoist with a leverage of about 6 to 1.

Faster production . . . Lower costs with Plastic Machining



Typical Revere (Twice-wrought) Brass Forgings.



Typical cross-sections of Revere Extruded Shapes.

Plastic Machining is pre-machining by us, while we have the metal heated to a semi-plastic form. It means that the Revere Brass Forgings or Extruded Shapes you receive, are well on the way to becoming your finished part or product. It means fewer operations and much less machining for you.

Figure out the advantages of this factor alone . . . in faster production, in lowered costs!

Now, add the advantages of the metal itself:

REVERE BRASS FORGINGS . . . being twice-wrought . . . have uniformity and density of structure, high tensile strength and consistent accuracy of dimensions. What machining you have to do, is not only reduced to a minimum, but can be done at high speeds. Handling is more rapid, work more accurate in jigs. Automatic or semi-automatic machine feeding is possible. Also, Revere Brass Forgings are free from defects. There are no rejects and scrap is reduced to a minimum.

REVERE EXTRUDED SHAPES . . . when used with special holders or chucks . . . may be fed into turret lathes or screw machines in long lengths. They may be turned and drilled as readily as concentric rod. They may be sawed into short lengths and hot or cold forged with great economy in press operations. Important savings in amount of flash (which is waste) results. Here, also, the close grain of the metal eliminates defects, pin-holes, etc.

It will pay you to find out how Revere Plastic Machining can serve you and save you money. For complete information address Revere Copper and Brass Incorporated, 230 Park Ave., New York City.

Revere Copper *and* Brass

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Revere COPPER BRASS Products

Baltimore *Division, Baltimore, Md.* Michigan *Division, Detroit, Mich.* Higgins *Division, Detroit, Mich.*
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Design and Care of Dies

(*Concluded from page 7*)

and, therefore, flows somewhat differently under the action of the hammer than it does when in the blocking impression.

The die designers at the Billings & Spencer forge shop have worked out many methods for increasing the life of the dies and for reducing the amount of metal required. When several forgings are to be struck in one set of dies, the arrangement of the forgings is important, as it frequently happens that, by reversing the position of one piece, end to end, a marked saving in the size of flash and consequently in the metal required results. The designers have found that it pays to leave substantial gates to permit the extrusion of excess metal and otherwise to reduce the flash to a minimum. The gates, themselves, are designed with a narrow rim or neck where they join the casting in order to facilitate trimming.

One of the large jobs run through the plant recently was a special type of wrench. Dies for forging two of these wrenches at one time were first made, but as the order continued to run it became apparent that dies forging four wrenches at a time would be an economy. Accordingly large special dies were made. Following the usual practice, templates were used in the die sinking and type or work forms covered with blue paint and pounded into the depression served as a check in completing the work. The dies were made out of large blocks of pre-tempered steel. An impression known as a semi-finisher, intermediate between the blocking impression and the finishing impression, was used to save the dies and extend their life. Following the practice for careful work, the trimming punch was accurately made from the forging itself.

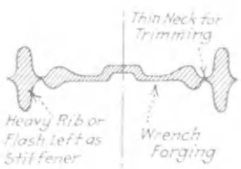


Fig. 4—Heavy flash is left on through the heat treatment to prevent warping of thin forgings.

Heavy Flash to Prevent Warping

Usually there is a slight variation between the actual and the estimated overall dimension of a forging as it leaves the dies, and it therefore proves best practice to make up the trimming punch to fit the forging rather than to make it to any arbitrary outline. Inasmuch as the wrenches were of thin section the dies were designed with a heavy flash which joined the forging with a thin section. This flash was left on through the heat treating sequence in order to prevent warping and the narrow section facilitated subsequent trimming.

It is the company's practice to drill bunter holes in die blocks wherever possible. These holes provide for insertion of bars or special tools to facilitate handling. The die blocks for all small work are hardened in the company's own heat-treating department. A 20-in. long die block has been established as the dividing line between the smaller ones, which are company heat treated, and those larger ones which are made up from the pre-tempered steel. In the case of the wrenches referred to, a gutter is left between two sets of wrenches to help the flow of metal under the hammer.

As is always the case, the longer a job of making special forgings continues, the more the refinements which may be introduced into the method of manufacture. In the case of the wrenches, the routine finally was developed to such a point that the operating lever of the hammer was tied down and its regular timed stroke was used as a pacemaker with two men taking the hot bars from two nearby furnaces and running them through the three-stroke operation in quick sequence. After heat treating and trimming, the wrenches were shoveled into an automatic tumbling sand blast and then were ready for shipment to the customer.

Valve Bushings of the Ford V-8

(*Concluded from advertising page 20*)

grinding operation. Following this job, the cylinder block passes through a washing machine similar to the one previously described for the cleaning off of the abrasive material.

Main bearings are burnished while the cylinder block rests on a special running-in stand or burnishing machine which is operated by a 40-hp., 775-r.p.m. motor. For this work a burnishing bar is put in the block in place of the crankshaft and later is removed.

Many of the assembly operations on the motor are done by hand. For workmen's convenience the motor during a considerable portion of its journey rests on end on a buggy drawn by a drag chain conveyor. Some of the hand operations consist of assembling the camshaft and crankshaft, removing main bearing caps, checking the dowel pin holes and pin bearings, cleaning the cylinder bores, fitting the pistons to the cylinder bore, stamping the connecting rods and caps in place, assembling the connecting rods to the crankshaft, testing for oil leaks and assembling the transmission. The cylinder head studs are assembled by a workman using a portable high-cycle motor with a special stud driver attached. Connecting rod caps are removed by means of motor-operated wrenches of Ford design.

At the end of the motor assembly line the motor is lifted by means of a hand-operated hoist with a leverage of about 6 to 1 from the assembly conveyor on to another conveyor to be taken to the testing stands. One man operates the lever while another steadies the motor. These two men together can handle 550 motors per 8 hr.

Cost Systems for the Steel Industry

(*Concluded from page 11*)

copies of Cost Data Sheets Nos. 1, 2, 4 and 5 are sent to all the superintendents and other persons entitled to receive the original pig iron cost sheet. Where there are several blast furnace plants in the same company, these comparative cost reports can be exchanged.

It is expedient that some one outside the operating or accounting departments should make the final analysis of the costs, and give the reasons for excess costs. Obviously such a man must be familiar with blast furnace operations and know considerable about pig iron cost accounting. Such a man must be able to point out the causes of excellence and of waste in the blast furnace practice, and be able to point out where further economies can be made by changes in materials or in practice.

In making such a searching analysis it is possible to detect errors in accounting that creep in occasionally, even in the best accounting departments. For instance, an excess cost for supplies at a blast furnace was found to be in error because a storekeeper and a clerk got mixed up and charged "5 bbl. of grease" to the blast furnace instead of charging "5 bbl. of black paint" to one of the coal mines of the same company. Departmental overcharges can often be detected by the superintendent on studying the cost data sheets.

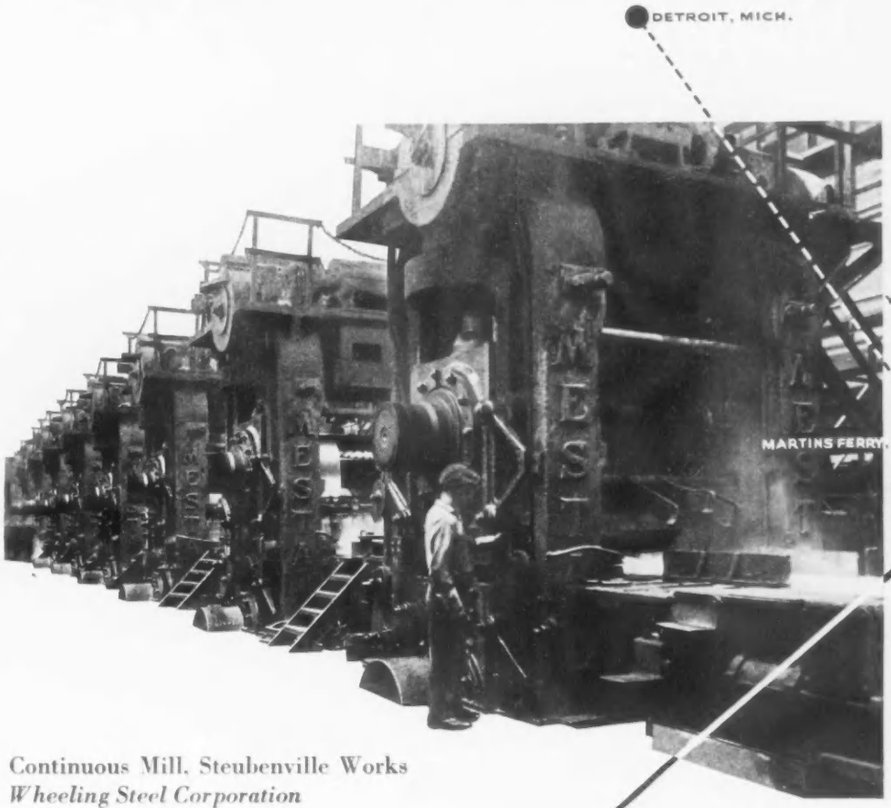
The mere setting-up of the basis for ideal costs calls immediate attention to any defects in construction, practice or accounting. The continued use of the comparative cost system for pig iron improves the blast furnace practice and reduces the costs.

American Airways, Inc., serving more than 60 major cities of the United States and Canada with its 10,000 miles of airways, carrying passengers, mail and express, will move its headquarters from New York to St. Louis, it is announced by the Industrial Club of the latter city. The company has taken a 25-year lease on space at Lambert-St. Louis Municipal Airport, and will occupy offices in a downtown location yet to be selected.

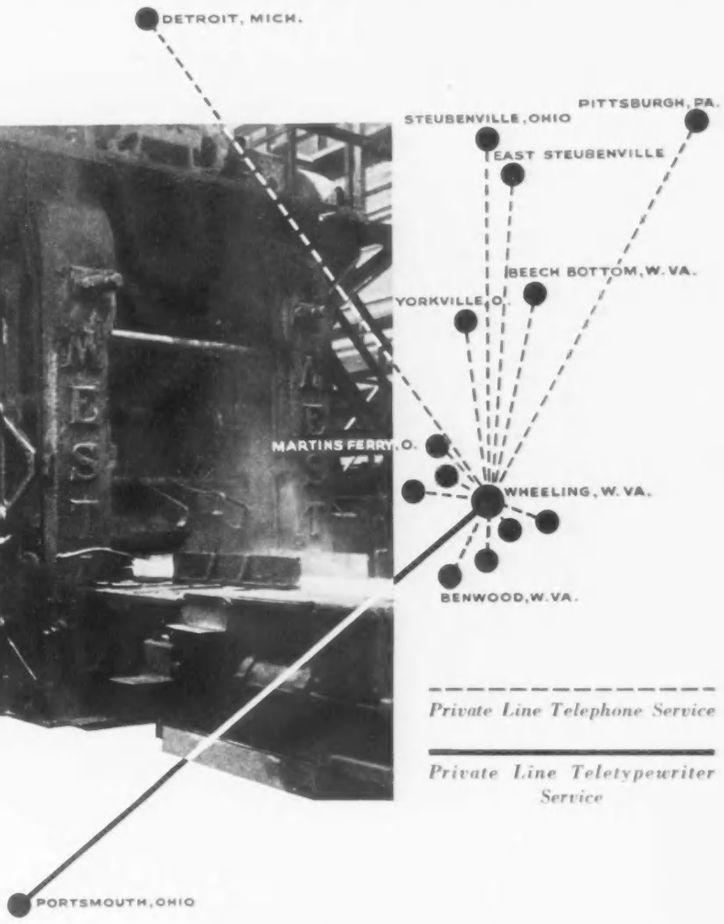
14 PLANTS AND OFFICES IN 4 STATES

CO-ORDINATED BY TELEPHONE AND PRIVATE LINE

TELETYPEWRITER SERVICE



Continuous Mill, Steubenville Works
Wheeling Steel Corporation



CLOSE executive control of 14 plants and district offices in many parts of the country, made possible by Bell System Private Line Services, is effecting economies for the Wheeling Steel Corporation, Wheeling, W. Va. Teletypewriter and telephone services co-ordinate the operations of all units as though they were under one roof.

Orders originating at sales offices are telephoned to the Wheeling headquarters of the company and are relayed over these private lines to the various producing units without delay. Specifications, shipping instructions, tool orders, contract details are quickly handled. These Bell System services bring to the activities of the Wheeling Steel Corporation greater flexibility and economy of operation, as well as a greatly increased speed in the servicing of accounts.

Teletypewriter Service—typing by wire—is used profitably by business organizations in every field. Messages typed on one Teletypewriter are instantly and accurately reproduced on all connected machines, no matter how far apart. Private line telephone service provides voice contact with offices, plants and other units throughout the business day. Both services are custom-fitted to the requirements of the individual user. Your local Bell Telephone Company will help you apply these modern business aids to your communication problems. Call the Business Office.

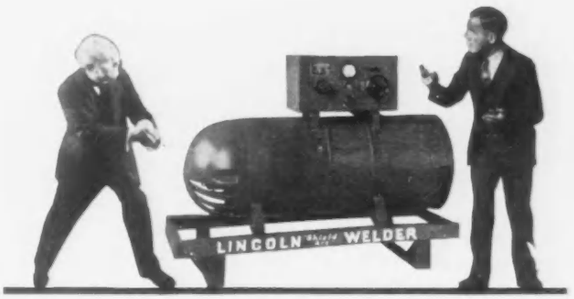
HERE IT IS . . .

THE NEW

LINCOLN "*Shield-Arc*" WELDER

Pop and Lad's Discussion of

The New LINCOLN *"Shield-Arc"* WELDER



"This new *'Shield-Arc'* is good looking all right, but what does it have besides good looks?"

"Its uniform welding current. *'Shield-Arc'* has taken the peaks of welding current and put them in the valleys."

"What of it?"

"Well, you know that if you take the bumps and hills out of a road you can make a much higher average speed in a given car... that means more miles per day. So *'Shield-Arc'* allows a higher average current for any given size rod and that means higher welding speed."

"Now that *is* something... but what about the capacity of this new welder?"

"Capacity? Well, you know present day shielded arc welding requires higher voltages, so *'Shield-Arc'* is made for this, rated at 40 volts."

"That's 60% more welder, but I suppose you pay for it in power consumed."

"There's another surprise for you. This *'Shield-Arc'* means 10% higher efficiency at full loads and even more on overloads, and its idling loss hasn't even been found yet."

"So it's really more economical electrically to operate, as well as faster? Well, that sounds good to my pocketbook. If it's as good as you say then I suppose it also has Dual Control of Welding Heat, Sparkless Commutation, Dead Front Control Panel and Arc-Welded Steel Construction as well as Drip Proof."

"Right, it has all of them—plus a Reversible Voltage Control which actually reverses direction in which current is generated. You don't have to shift cable connections to change polarity of welding current . . . just turn that little lever up there on the 'handy height' control panel."

"And that meter is center reading, too. You can tell by a glance at that meter the polarity of the welding current. It all sounds too good; must be a catch somewhere."

"Skeptical, eh? Well, here's the Lincoln 3-Way Guarantee of welding with a *'Shield-Arc'* Welder:

1. More weld metal deposit per K. W. H.
2. Faster welding per K. W. H.
3. Lower cost per unit of welding—the unit being per lineal foot of weld, or per pound of weld metal, or per hour of welding.

You can't lose on the welder whose welding performance is guaranteed."

●*For specifications and detailed description of the new Lincoln 'Shield-Arc' Welder, write*

THE LINCOLN ELECTRIC COMPANY · CLEVELAND, OHIO

Largest Manufacturers of Arc Welding Equipment in the World

W-21

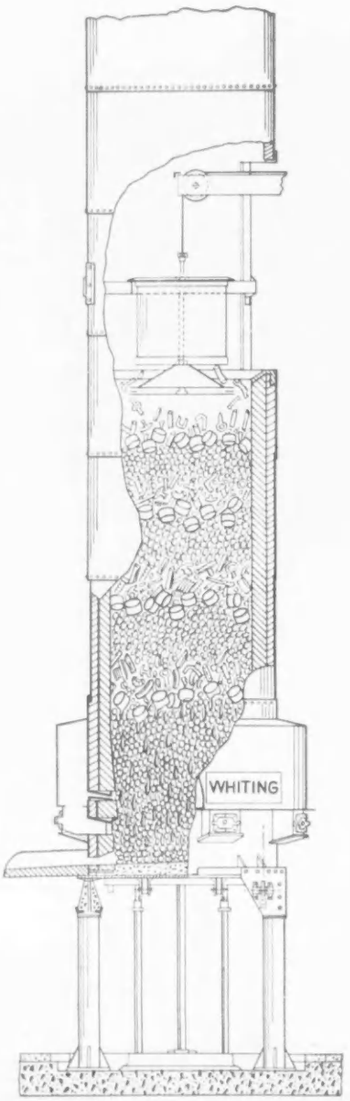
CUPOLA ALLOYS

need INTERFERENCE, too

EXPECTING an unprotected alloy to reach the melting zone of a cupola uncontaminated is like expecting a fullback to make a touchdown without interference. It can be done, but with no high average of success.

But when you add silicon, manganese, or chromium in the form of E. M. Briquets, oxidation cannot "take it out of the play" because a refractory binder sheathes the alloy until it reaches the hottest zone. Then the binder disintegrates and releases the alloy at the point where it does the most good.

Each E. M. Briquet contains a fixed amount of silicon, manganese, or chromium, which is delivered without loss to the iron. As a result, recovery is higher and off-iron is prevented. If you want to simplify foundry practice and produce better castings at lower cost, ask Electromet Engineers to explain how E. M. Briquets can help you. A request today will bring you complete information.



This E. M. BRIQUET was removed just before entering the melting zone and shows how the alloy is protected from oxidation during its descent through the upper oxidizing zone of the cupola.

Electromet
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ELECTRO METALLURGICAL SALES CORP.
Unit of Union Carbide and Carbon Corporation

UCC

CARBIDE and CARBON BUILDING, 30 EAST 42nd ST., NEW YORK, N. Y.

A *Common-sense* BASIS for judging rope cost

Seldom is a rope user interested merely in the service given by a single wire rope. To the contrary, and particularly if he uses ropes in sizeable quantity, he is concerned about the performance of his ropes as a whole, about their *Average Service.*

This is at once the common-sense and most exacting basis for judging wire rope service cost. It is the basis advocated by Roebling, in which rope cost per ton of material handled, per mile traveled, or per other unit of service measurement, is based not on the service of a single rope but on the *average* service of several ropes.

Roebling Wire Ropes are made to give *uniformily* good service. No wire ropes, regardless of make or construction, will show lower general-average operating costs.

JOHN A. ROEBLING'S SONS COMPANY, TRENTON, N. J.

Wire · Wire Rope · Copper & Insulated Wires & Cables · Welding Wire · Flat Wire · Wire Cloth & Wire Netting

Atlanta Boston Chicago Cleveland Los Angeles New York Philadelphia
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A plain statement about Wire Rope Economy

Roebling does not indulge in nor encourage sweeping claims of superior wire rope economy. Such claims, if generally made, would merely confuse the rope user. ¶ For the guidance of rope buyers, however, Roebling does assert that when gauged by the work performed, NO wire rope, regardless of make or construction, will show lower general average operating costs than Roebling.

Wire Rope for all purposes

The importance of selecting the right rope for each use cannot be too strongly emphasized. For no one rope will meet all requirements. ¶ Roebling makes wire rope of a great variety of types and designs, including Standard Right, Left, Lang, Preformed and Alternate Lays, in all degrees of rope and strand flexibility. ¶ The great stamina of all Roebling Ropes is primarily due to the quality of Roebling Wire. This Acid Steel Wire is renowned for its fatique resisting and wearing qualities. No better rope wire is produced. ¶ "BLUE CENTER" STEEL is the highest grade and is generally recommended for severe duty.

JOHN A. ROEBLING'S SONS COMPANY

ACME STRIP STEEL

●Hot Rolled

Acme Hot Rolled Strip Steel is furnished in widths up to 22 inches wide in long length coils or straight cut lengths. It is supplied in mill finish, pickled and oiled, or pickled and limed. . . . . Hot Galvanized and Electro-Galvanized finishes are also obtainable in a wide range of sizes.

●Cold Rolled

Acme Cold Rolled Strip Steel is rolled in all the various commercial finishes, edges, tempers, and sizes up to 21½ inches wide, and furnished in long length coils or straight cut lengths. . . . . We specialize in Electro-Galvanized, Hot Galvanized, and Acme Stainless cold rolled strip. . . . . Write for catalog.

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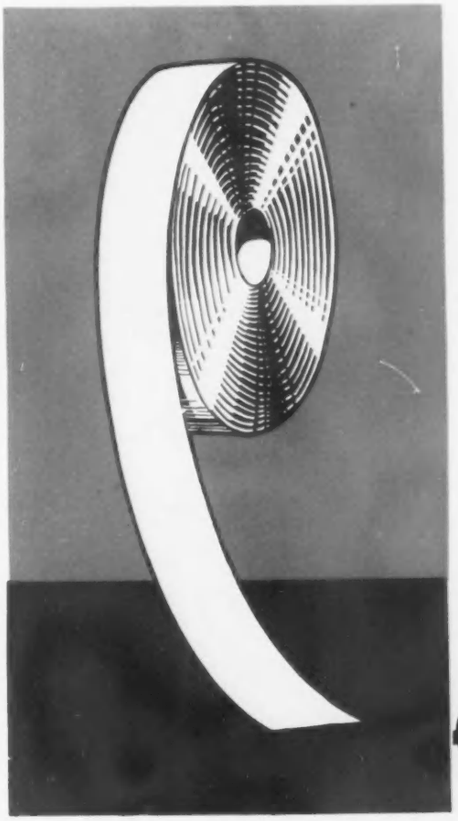
Strip Steel



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Sizes from ½" to 24" wide—for all purposes.

Capacity—250,000 tons per annum.

For corrosion resistance specify Allegheny metal. It is the most outstanding corrosion resistant ferrous alloy produced in commercial quantities at a moderate cost.

We Roll and Sell Allegheny Metal in Strip Form

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WAREHOUSE STOCKS of Cold Rolled Strip Steel are carried by EDGCOMB STEEL CO., Philadelphia—EDGCOMB STEEL CORP., Newark
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ON ONE HAND IT'S **MATERIAL**

Tensile tests of Murex mild steel all-weld metal repeatedly show an ultimate strength of 65,000 to 70,000 lbs. per sq. inch and an elongation in 2 inches of 25 to 30%

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CONSIDER your welding electrode for what it really is . . . both a material and a tool.

You know what material you want. Obviously your deposited metal must have physical properties which at least equal those of the parent metal. With Murex Heavy Mineral Coated Electrodes you get that and more. Murex provides a margin of safety... a generous plus of strength and ductility which is always good to have when inspection and service requirements are rigid.

But the tool characteristics of your electrode are also important. Murex is a precision electrode which brings a new control to welding . . . which enables you to boost the amperage without danger of undercutting, excessive spattering, porosity, or loss of ductility. Rejects are fewer, speed is higher, welding cost lower per cubic inch of deposited metal.

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A MUREX ELECTRODE IS BOTH A PRECISION TOOL AND A FINE MATERIAL

Murex Electrodes are made in the United States by the American Murex Corp. and are sold by the Metal & Thermit Corp., pioneers of welding and manufacturers of Thermit. Literature on Thermit welding for many kinds of heavy repair work promptly sent on request. Write.

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HEAVY MINERAL COATED ELECTRODES

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In sheet steel for deep-stamping and especially automobile work, the value of adding Ferro Carbon Titanium to the ladle is reflected in a more uniform, ductile and durable product.

Many prominent mills, moreover, find that the yield of good steel is increased by this ladle addition, and that sounder, cleaner surfaces are produced. Obviously this reduces costs.

The many years of practical experience which Titanium Alloy engineers represent are at your disposal. Let their recommendations enable you to apply FCT to your specific requirements —to make good steel better. Write today.

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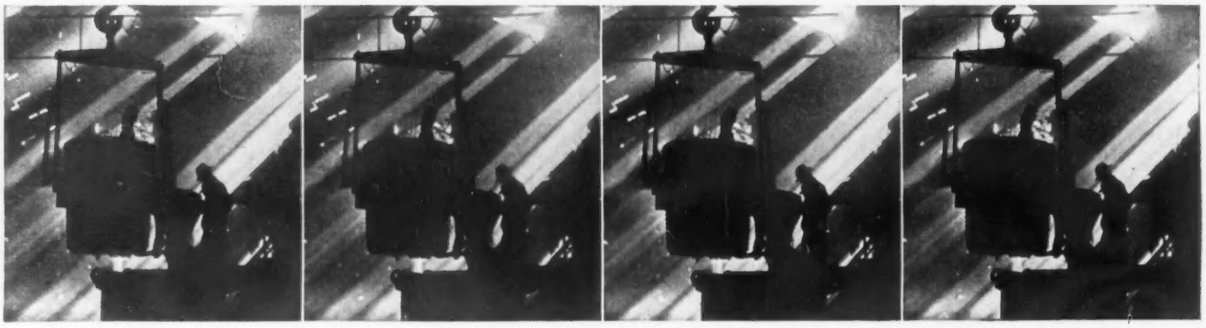

IN MAKING ANY PRODUCT OF MERIT THE MOST IMPORTANT INGREDIENT IS CRAFTSMANSHIP

Particularly is this true of steel. It serves so many purposes, meets so many and such varying conditions, is so definitely woven into the equipment and processes of Industry today—that it has become a highly specialized servant.

Midvale knows steel from its swaddling clothes' days. Midvale pioneered in alloys, in the laboratory study and development of steel for its present-day uses. Midvale's new laboratory is still pioneering today.

Midvale workmen, in both laboratory and shop, are working on and solving actual problems that confront them in their own plant—problems of strength, of service, of heat and corrosion resistance, of the use of steel under any given condition. They have developed a knowledge of steel, a skilled craftsmanship in its handling that is not easy to match. They offer that skill and knowledge to you.

The proper steel for the specific purpose has always proven truest economy, and adds to the efficiency of your plant, adds to the quality of your product. Call upon THE MIDVALE COMPANY at its most convenient office—Philadelphia, New York, Pittsburgh, Washington, Cleveland, Chicago, San Francisco.

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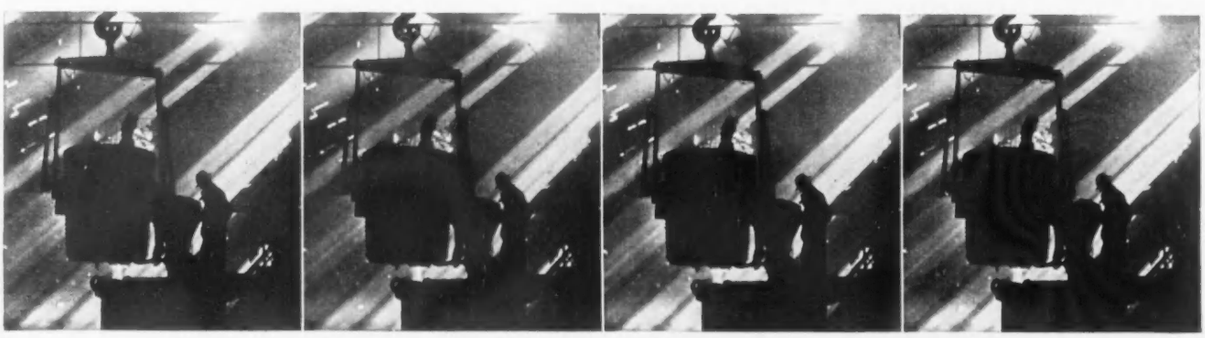

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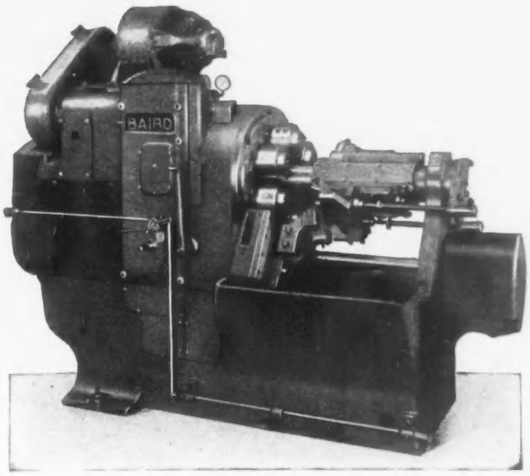

Baird 7" Automatic Horizontal 6 Spindle Lathe for Chucked Work. Verticals with Capacity 10½" dia.

Now, while you've got the chance, put the time study on your single spindle operations. Yes, clock the multiples, too, and then ask for a Baird estimate on these jobs.

"Ask BAIRD About it"

We have been doing some time and cost study work on hundreds of production problems, and on those 60 years of continuous study we have designed 6 spindle horizontal and 8 spindle vertical automatic machines that we believe will outperform your present equipment.

For chucked work the machines may use jaw chucks, collets or special holding fixtures. For centered work a turret carries the tail centers, and compensation for wear is provided at each turret station to give maximum support to the work.

Throughout, mechanical skill is built into these machines so that greatest production at low cost may come out of them, and users say we have succeeded. So we repeat, look over your present methods, and then . . .

"Ask BAIRD About it"

THE BAIRD MACHINE COMPANY

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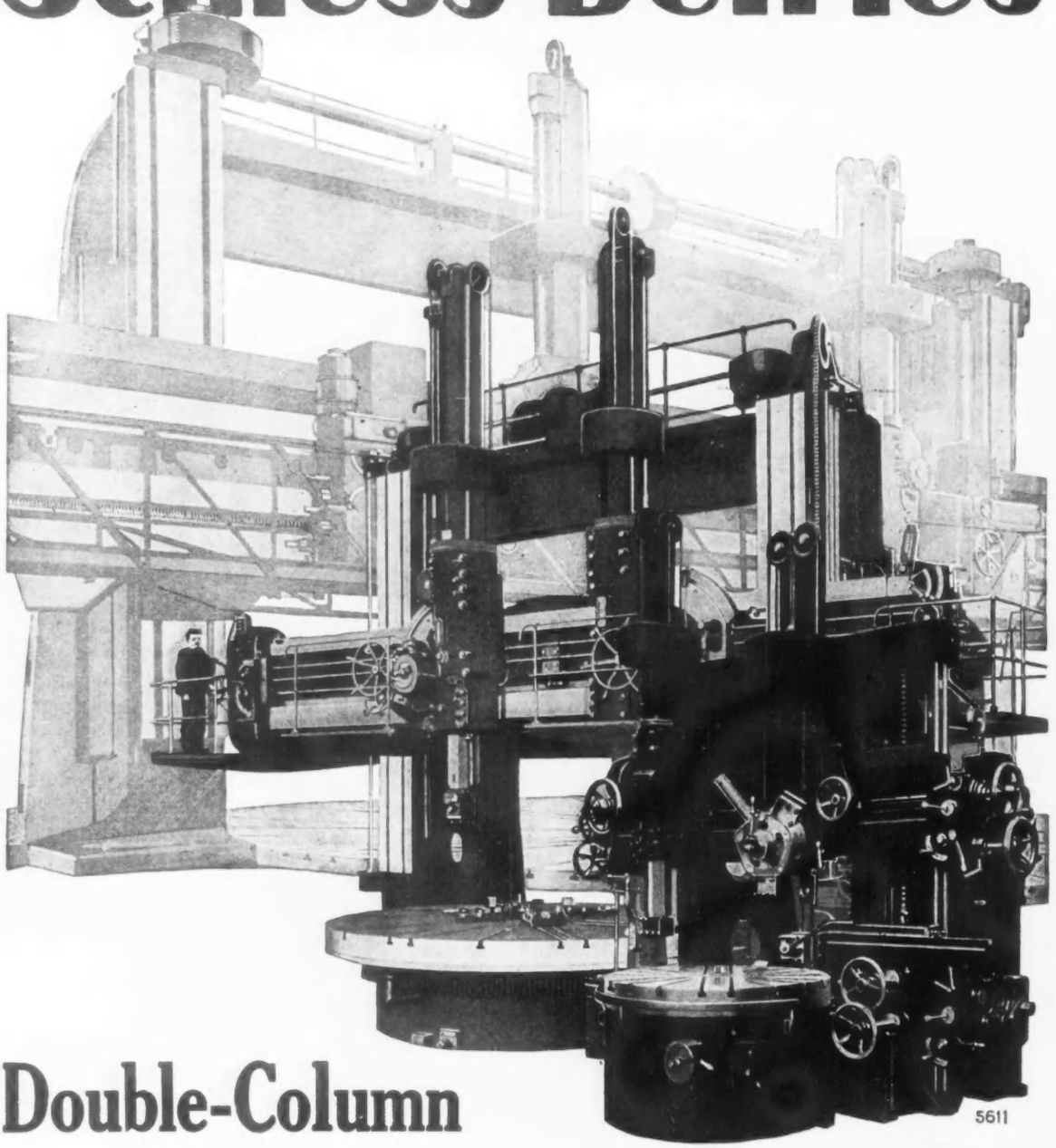

5611

Double-Column Vertical Turning and Boring Mills

for 4' to 60' turning diameter and larger

REPRESENTATIVE FOR U.S.A.: U. KAUERMANN, FOUNTAIN SQUARE BLDG., CINCINNATI, O.

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Now is a time when

Thrifty Managers Win

JAMES J. HILL said that the measure of success in a man is his ability to save. This is equally true of a business. It's the day after day saving of nickels, dimes and quarters that often builds slim yearly earnings up to substantial dimensions. For this reason any saving in cost of handling raw materials and finished goods; any saving in "waiting time" on production processes is of real importance.

Because handling costs do loom so big in many production operations, they become a logical starting point for an "economy survey." We can help you to discover whether working time is employed as profitably as it would be with modern handling machinery. Whether your machinery or equipment for producing goods is operating continuously, with no "time out" waiting for supplies. Whether floor space is being used to best advantage.

Sometimes a small Shepard Electric Hoist, at a cost of a few hundred dollars, will effect continuous, daily savings that total a sizable amount at the end of the year.

Some Convincing Evidence

1—"We replaced a chain block with a Shepard Hoist which does the job four times as fast, saving $2600 a year."

2—"Two Shepard Hoists over the galvanizing vats . . . replaced old floor drum-hoists and have speeded up production 50%. The Shepards saved us at least $6000 a year . . ."

3—"Our old method was to have the charge wheeled to the furnace, dumped and shoveled in by hand. That took 10 minutes—the Shepard Hoist takes 1 minute . . . $2000 a year is saved."

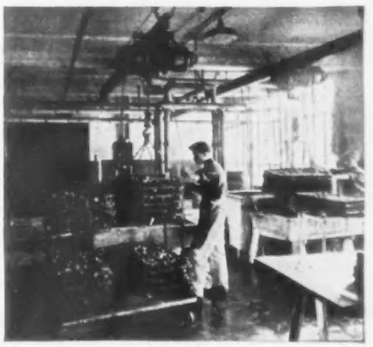
4—"The Shepard Hoist cuts loading time 50% and prevents a jam of trucks at the platform."

5—"We doubted that an electric hoist could fit in our 40 year old packing plant. But the Shepard Electric Hoist sped production and saved $6552 yearly. We can kill 19 to 21 cattle a day where 7 or 8 made a heavy day's work before."

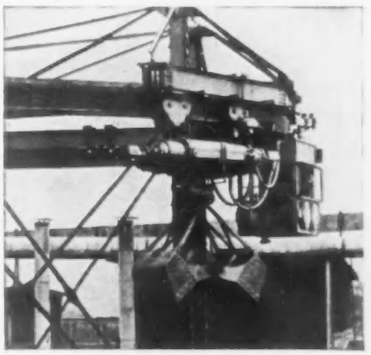
6—"The Shepard Hoists saved us around $300 a week, but as they handle a seasonable product, the saving only applies for a period of 6 months."

A Survey of Your Plant

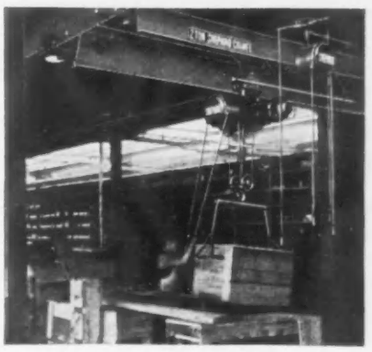
. . . may reveal operations where comparable economies can be effected by properly planned load handling. We would consider it a privilege to be permitted to have one of our engineers assist you with his intimate knowledge of innumerable cost-cutting applications. Write to us and we will have our nearest office send him to see you. It places you under no obligation.



Floor Control Electric Hoist



Cage Control Mono-rail Hoist



Floor Control Transfer Crane

Shepard Niles material handling equipment includes Electric Hoists, Mono-rail and Transfer Cranes, and Cupola Chargers. The range of sizes and types is incomparably complete, and our own lower production costs are reflected in our revised prices.

SHEPARD NILES CRANE & HOIST CORPORATION
356 Schuyler Avenue, Montour Falls, N. Y.
Works: Montour Falls, N. Y., Philadelphia, Pa. Branch Offices in Principal Cities

SHEPARD
ELECTRIC CRANES AND HOISTS

SHEPARD NILES CRANE & HOIST CORP.
356 Schuyler Ave.,
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As your first move, why not write for this interesting book of profitable experiences with Shepard Electric Hoists?

*Name*_____
*Company*_____
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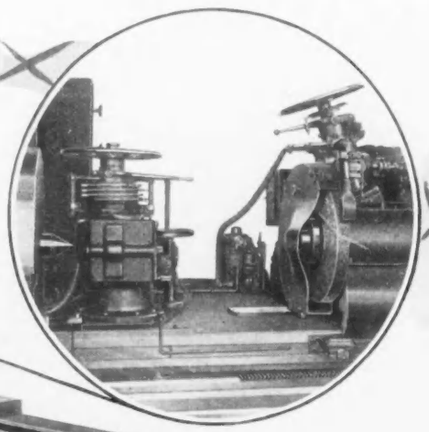
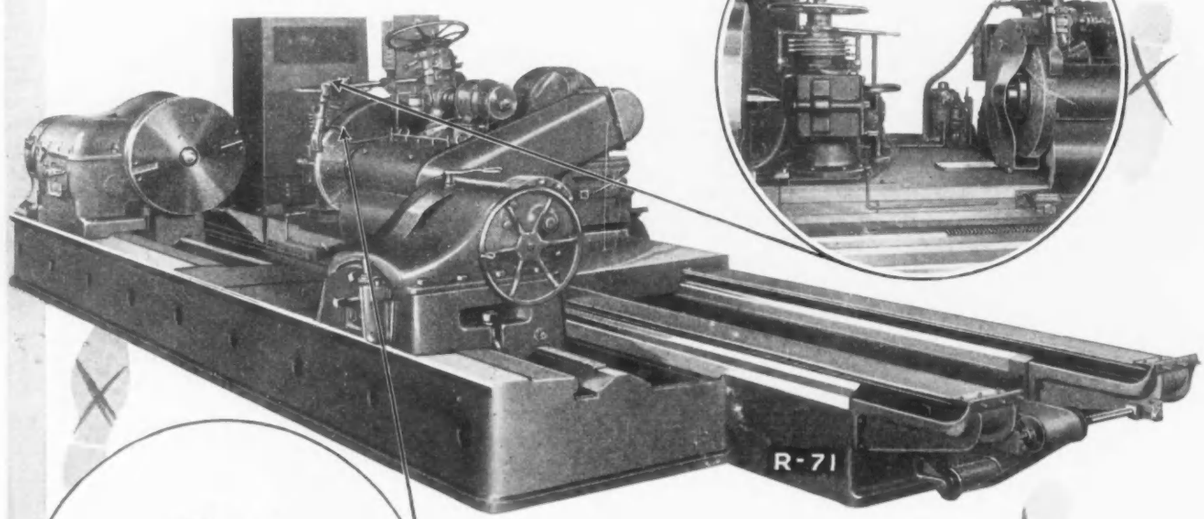
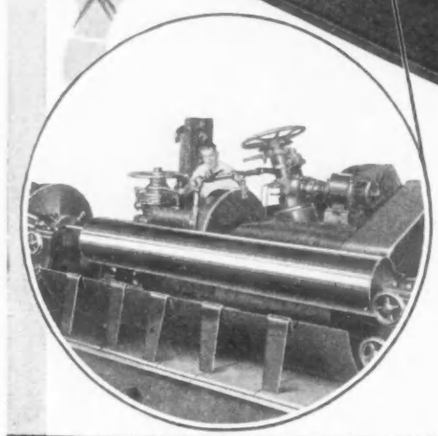
COMPLETE CONTROL WITHOUT A SINGLE STEP

on The New LANDIS TYPE 30 ROLL GRINDERS

The ideal machine tool is one that is completely and instantly within the control of the operator. From this point of view, as from many others, the new Landis Roll Grinders are ideal machines. The inserted close-up views show plainly that all controls—both mechanical and electrical—are grouped closely about the operator's platform.







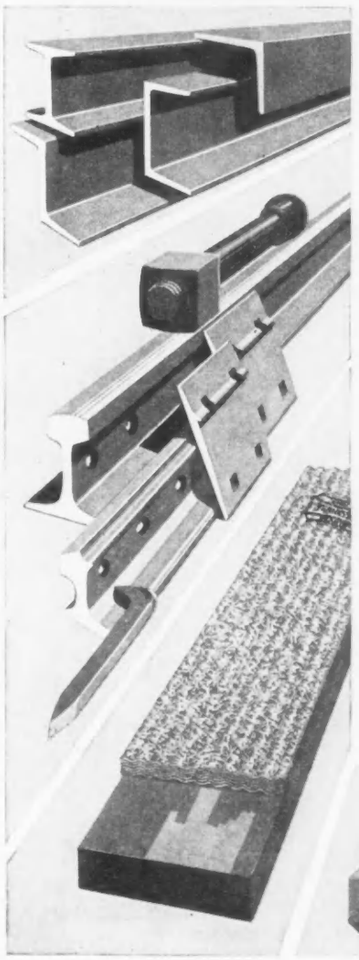
Of major importance also is the position of the operator with relation to the point of contact between the wheel and the work. Here again this machine is designed in an ideal manner as, from his normal position, the operator sees exactly what is taking place at the point where the work is actually being done.

LANDIS TOOL COMPANY
WAYNESBORO PENNSYLVANIA

DETROIT CHICAGO NEWARK PHILADELPHIA

78

TENNESSEE Steel

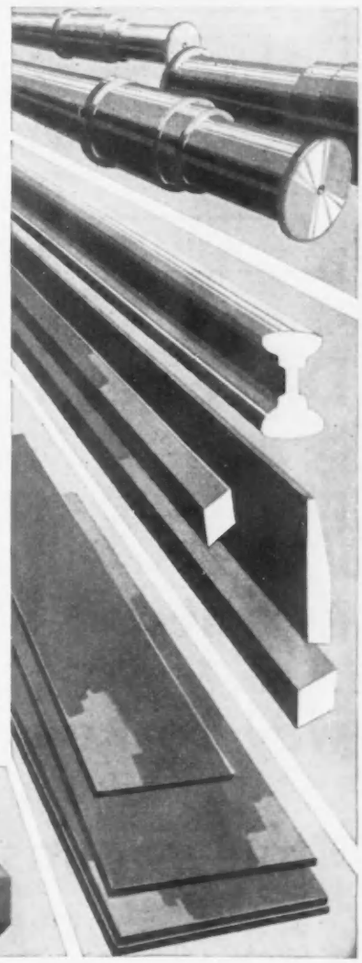


Start with *the* Right Steel...

WHETHER you are a consumer of steel or a purchaser of steel for conversion into other forms, you well realize the necessity of starting with a good product.

There is no surer way of selecting a first class steel product than to purchase from a concern with a good name.

When you settle on Tennessee as your source of supply, you have taken a most important step in your selection of materials. You *know* that the quality will be *right*, the size will be *right*, the finish will be *right*, and the shipment *right* when you want it.



TENNESSEE COAL, IRON & RAILROAD COMPANY

General Offices: Brown-Marx Building, Birmingham, Ala.

Subsidiary of United States Steel Corporation

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES

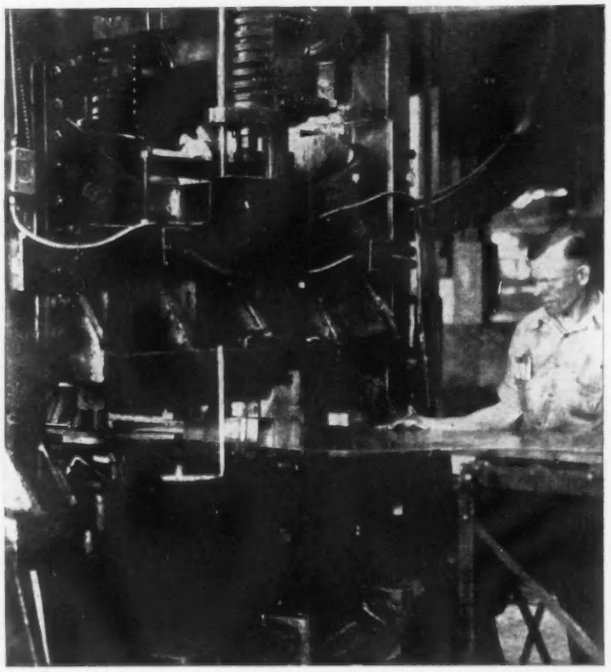
AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY
CARNEGIE STEEL COMPANY
COLUMBIA STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY
OIL WELL SUPPLY COMPANY
THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & R. R. COMPANY
UNIVERSAL ATLAS CEMENT COMPANY

Pacific Coast Distributors—Columbia Steel Company, Russ Building, San Francisco, Calif. *Export Distributors*—United States Steel Products Company, 30 Church Street, New York, N. Y.

Punching

In punching, as in other fabricating operations, Youngstown Sheets have consistently effected worthwhile manufacturing economies for thousands of fabricators.

The picture at the right shows a punching operation in the manufacture of one of the thousands of products which are constantly demonstrating the outstanding advantages of Youngstown Sheets in all fabricating operations.



YOUNGSTOWN SHEETS

Don't let a rejection pile in your shop drain the expected profits to which you are entitled. Let Youngstown show you a way to keep your waste to a minimum.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

General Offices: YOUNGSTOWN, OHIO

One of the oldest manufacturers of copper-steel, under the well-known and established trade name "Copperoid"

YOUNGSTOWN

SHEETS FOR EVERY PURPOSE .. INCLUDING YOURS

A Manufacturer's Confidence in Vanadium Steels . . .

"A Replacement Free If the Tool Fails"

THE Herbrand Company, of Fremont, Ohio, markets its "Van-Chrome" wrenches and other drop-forged tools with an absolute guarantee of free replacement if failure occurs.

Maintaining such a guarantee would be impossible without the proper steel. But "Van-Chrome" tools *are* made of the right steel . . . Chrome-Vanadium. It was adopted for "Van-Chrome" tools over twelve years ago, and has consistently demonstrated its suitability and dependability.

The Herbrand Company has found Chrome-Vanadium Steel exceptionally uniform in response to heat treatment. It develops the surface hardness essential to give adequate wear-resistance, while its toughness, shock-resistance and anti-fatigue properties contribute greatly to dependable, failure-free service. The high physical values of Chrome-Vanadium Steel have enabled Herbrand engineers to make "Van-Chrome" wrenches thinner and longer, thus giving greater ease of handling and accessibility to confined quarters where heavier wrenches would be practically useless.

In wrenches and tools—winches and tractors—in practically every industrial application requiring unusual properties and utmost dependability—Vanadium Steels are serving satisfactorily. Our Metallurgists will gladly tell you about Vanadium Steels that will meet your requirements. Write us today.

VANCORAM

FERRO-ALLOYS

of vanadium, silicon, chromium and titanium; silico-manganese, tungsten and molybdenum, produced by the Vanadium Corporation of America, are used by steel makers in the production of high-quality steels.

VANADIUM CORPORATION OF AMERICA

120 BROADWAY, NEW YORK, N. Y.

DETROIT *Book Tower* — PITTSBURGH *Bridgeville, Pa.*

Plants at Bridgeville, Pa., and Niagara Falls, N.Y.

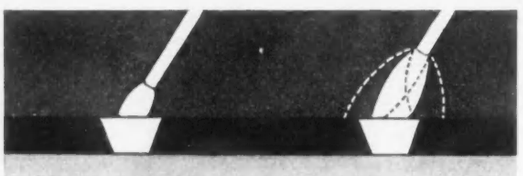
Research and Development Laboratories at Bridgeville, Pa.

VANADIUM STEELS

for strength, toughness and durability

CLOSE CONTROL

enables you to deposit the metal exactly where it belongs



A *short arc*—this enables the welder to direct the flow of metal, with the result that all of it is deposited at the desired point.

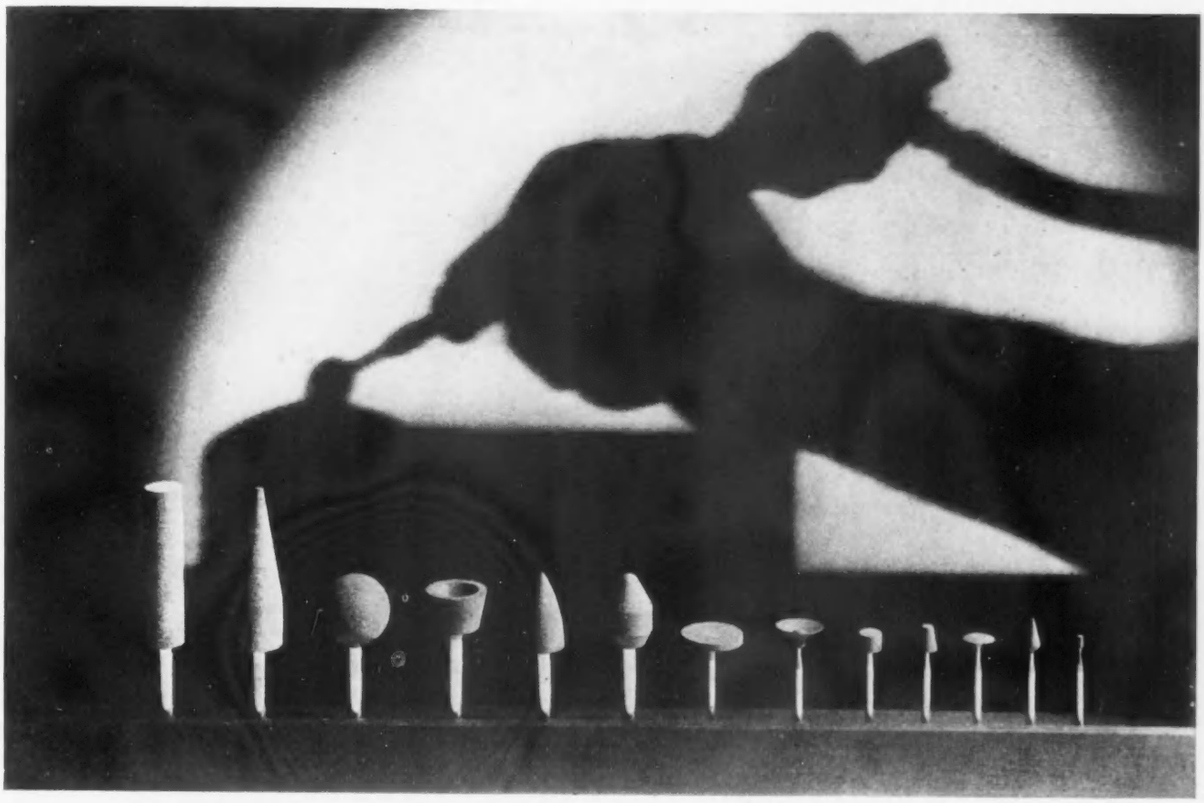
A *long arc*—this makes it difficult to direct the flow of metal, with the result that only part of it is deposited at the desired point.

Only with *close control* of the welding current can you direct the deposit of molten metal to the exact point desired — one of the first essentials of a perfect weld. Moreover, *close control* — the outstanding feature of Wilson Welders — saves time, metal and money. Write to Wilson Welder & Metals Co. Inc., North Bergen, N. J., for complete information.

WILSON

ARC-WELDING MACHINES AND WIRE

Copr. 1932, Wilson Welder & Metals Co. Inc.



You'll Like These Mounted Wheels and Points

NORTON GRINDING WHEELS

THEY are made of 38 Alundum abrasive with its well-known features for grinding die and tool steels. A special spindle design and a special cement assure a securely anchored mount. With ordinary care Norton points and wheels can be used down to a very small stub — an economy feature that is very important.

Norton Mounted Wheels and Points are available for all of the popular makes of grinders — both internal and the air, electric and flexible shaft types of portable — in all of the popular sizes and shapes, grains and grades.

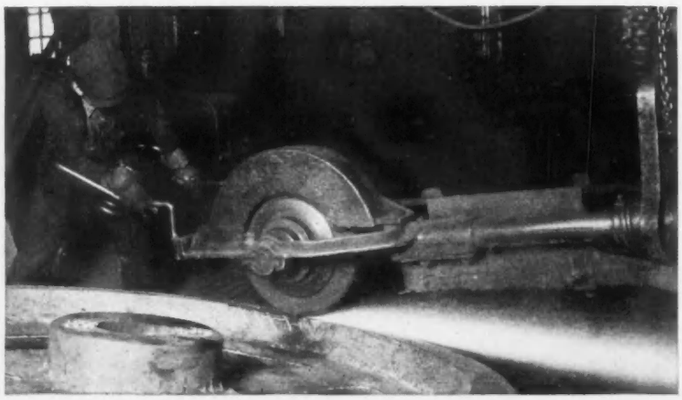
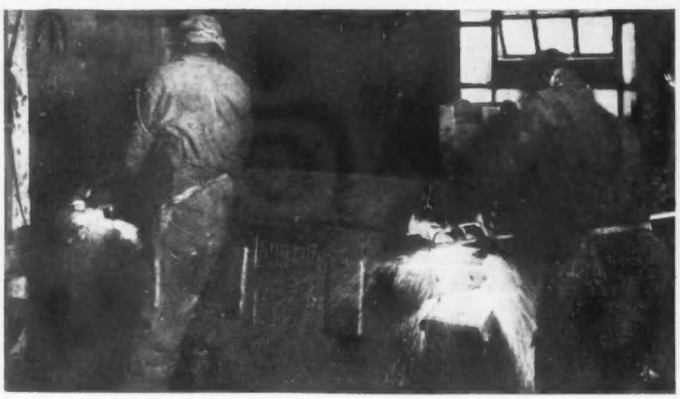
For grinding cast iron, brass, copper and similar materials there are wheels and points of Crystolon abrasive.

NORTON COMPANY, WORCESTER, MASS.

New York Chicago Detroit Philadelphia Pittsburgh Hartford Cleveland
Hamilton, Ont. London Paris Wesseling, Germany

W-411

NORTON PRODUCTS—Grinding Machines; Lapping Machines • Grinding Wheels; Abrasives for Polishing; India Oilstones, Pulpstones • Laboratory Ware, Refractories; Porous Plates • Non-slip Tiles and Aggregates

With any method of snagging
high speed wheels cut costs

Each man in the grinding shop can turn out more work—or a given amount of work in less time—if he operates high speed snagging wheels. Wheels bonded with phenol-resinoids will grind coolly, safely and efficiently at speeds up to 9,000 S. F. P. M. These wheels are easier to operate too, requiring less pressure to cut deeply. This makes the snagging job less tiring and increases the operator's productive time.

Phenol-resinoid bonded wheels last longer, for the bond holds the grit in close contact with the work and does not release it until it is worn and dull. Then it sheds the worn particles allowing the sharp underlying grit to come to the surface. Thus you get more cutting from each grain of abrasive.

Abrasive wheels bonded with phenol-resinoids produced by Bakelite Corporation are made by leading abrasive wheel manufacturers. They are available in types and sizes for snagging, cut-off, centerless, portable and various other automatic and semi-automatic grinding machines. Write us for a list of the names and addresses of these manufacturers.

BAKELITE CORPORATION, 247 Park Avenue, New York, N.Y...635 West Twenty-Second Street, Chicago, Ill.
BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Ontario, Canada

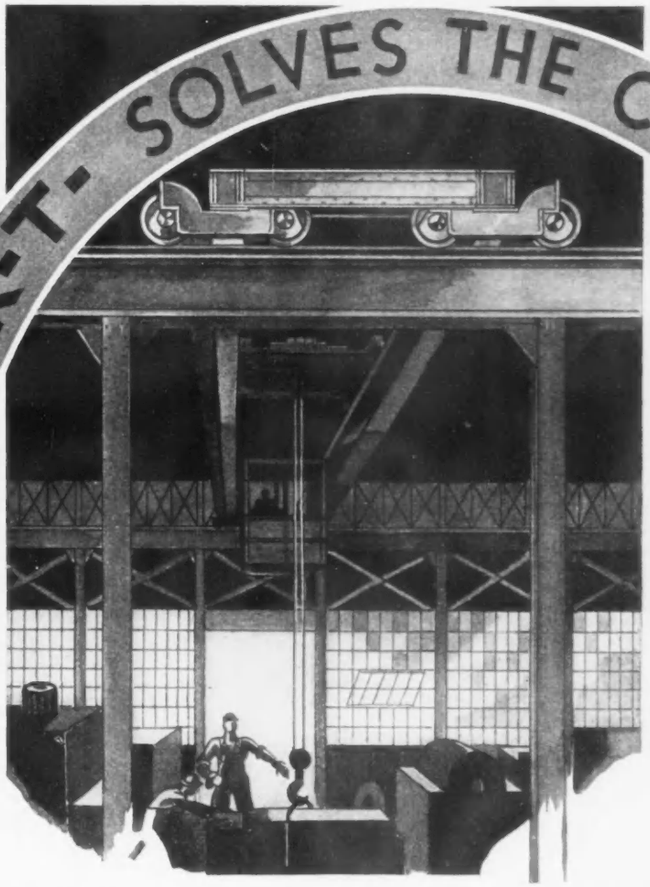
BAKELITE

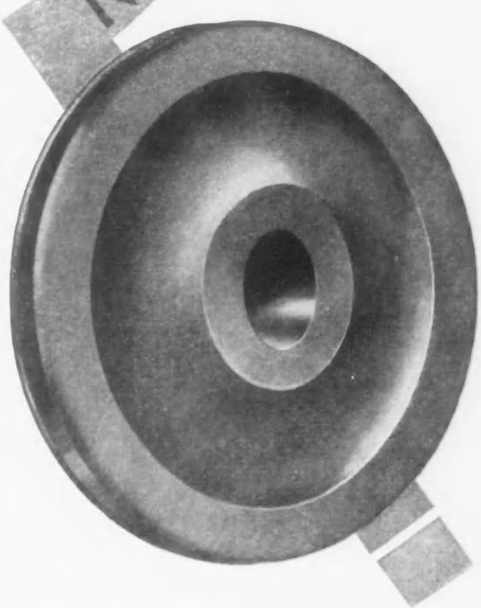
REGISTERED U. S. PAT. OFF.

The registered trade marks shown above distinguish materials manufactured by Bakelite Corporation. Under the capital "B" is the numerical sign for infinity, an unlimited quantity. It symbolizes the infinite number of present and future uses of Bakelite Corporation's products.

THE MATERIAL OF A THOUSAND USES

R-T- SOLVES THE CRANE WHEEL QUESTION





YOU don't have to wait until you purchase new crane equipment to learn of the advantages of Carnegie R. T. (Rim Toughened) Crane Wheels. Use them now for replacements on your present equipment. You will find that the process of heat treatment to which these wheels have been subjected has solved your crane wheel question. It has produced a wheel with an especially tough rim and with high physical properties . . . a wheel capable of withstanding heavy loads and which is highly resistant to wear . . . a wheel that has created a higher standard of crane wheel service.

While Carnegie Rim Toughened Crane Wheels are generally furnished with tread and flange finish machined and with hub rough bored, they may, if desired, be furnished rough machined and rough bored only. Send today for the booklet "Carnegie Rim Toughened Wrought Steel Wheels". Our wheel engineers will also welcome an opportunity of discussing this subject with you.

CARNEGIE STEEL COMPANY · PITTSBURGH

Subsidiary of United States Steel Corporation

191

CARNEGIE CRANE WHEELS

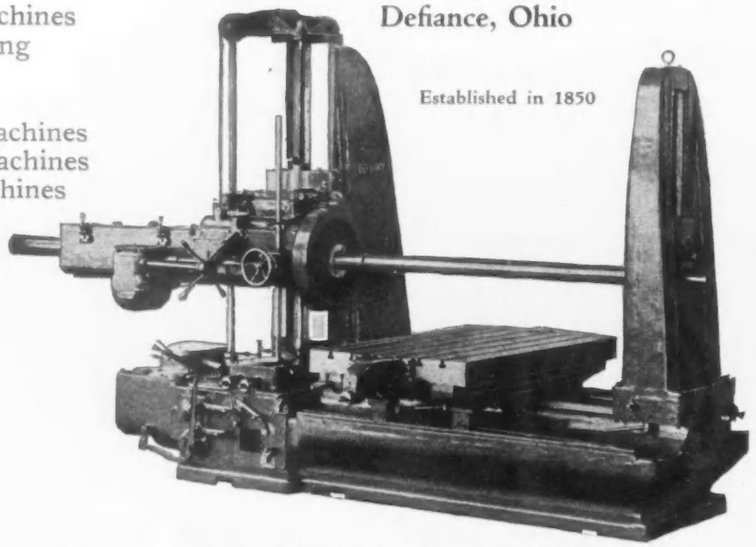
The Defiance No. 6 Horizontal Boring, Milling, Drilling and Tapping Machine is cutting production costs and turning out superior work wherever it is used. If you are interested in this type of service get in touch with our engineers—they have helped many manufacturers to attain greater profits.

The Defiance Machine Works

Defiance, Ohio

Established in 1850

Cylinder Boring Machines
Heavy Service Drilling Machines
Rail Drills
Multiple Drilling Machines
Multiple Tapping Machines
Valve Grinding Machines



No. 6
4½ in. Spindle
Smaller Sizes:
Nos. 5-A and 5

Independent Power Rapid Traverse, both directions, for Head and Platen, giving 84" per minute.

Designers and Builders of Precision-Production Machine Tools

Iron Ore
Pig Iron
Coal
Coke

Cleveland Cliffs

TRADE C C C MARK

THE CLEVELAND-CLIFFS IRON COMPANY

UNION TRUST BUILDING, CLEVELAND, OHIO

THE MARTINEZ BENICIA BRIDGE across SUISUN BAY, CALIFORNIA

THIS bridge was completed in 1930, and was built for the Southern Pacific Railroad to carry its main line without ferry interruption from Oakland northward to Sacramento, Portland and Seattle, and eastward over the Overland Route. The structure is a double track railroad bridge 5603 feet long end to end of steel work.

THE STEEL SUPERSTRUCTURE WAS

FURNISHED, FABRICATED AND ERECTED BY

AMERICAN BRIDGE COMPANY

Subsidiary of United States Steel Corporation

MANUFACTURERS of BRIDGES, BUILDINGS

and other classes of steel structures

General Offices: Frick Building, Pittsburgh, Pa.

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Machine Keys

MOLTRUP Machine Keys are made from a special accurately finished material having excellent wearing qualities adapted for key work. Our line of finished machine keys includes Standard Gib Head and Plain Taper Keys, Round End Feather Keys, Special Gib Head and Flat Taper Keys of every possible size and shape, Connecting Rod Keys, Tail Stock Keys, Double Tit Keys, Center Tit Keys, Dovetail Keys and Steel Keys for every manufacturing use. We can also make up any special sizes or extra large quantities to order on short notice.

Important reference data included in our catalog will prove useful. Write for your copy.

Moltrup Steel Products Co.

Beaver Falls, Pa.

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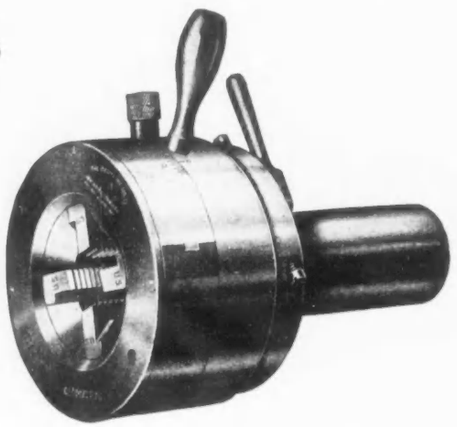
SALES AGENCIES: CHICAGO, Ill.—Central Steel & Wire Co., 4545 Southwestern Blvd.; DAYTON, Ohio—Central Steel & Wire Co., East Monument Ave., Extended; DETROIT, Mich.—Central Steel & Wire Co., 5035 Bellevue Ave.

For Those Coarse Pitch Threads



THERE'S not a Self Opening Die Head made that's as rugged and sturdy as the Geometric Style D. That's the reason why this tool is so universally used on coarse pitch threads such as 4 U. S., Double Acme, Buttress, etc.

Big heavy chasers backed up by a heavy mass of metal are employed. Furthermore the chasers are positively cammed open and closed. It's an easy tool to operate and adjust for size, too. The quick removable chaser feature—take out chasers without removing plates or screws—much copied today, has been incorporated in this tool for over twenty-five years.

Write for the D Type Die Head Booklet. Get all the facts on these tools—the most widely used Die Heads in the world.

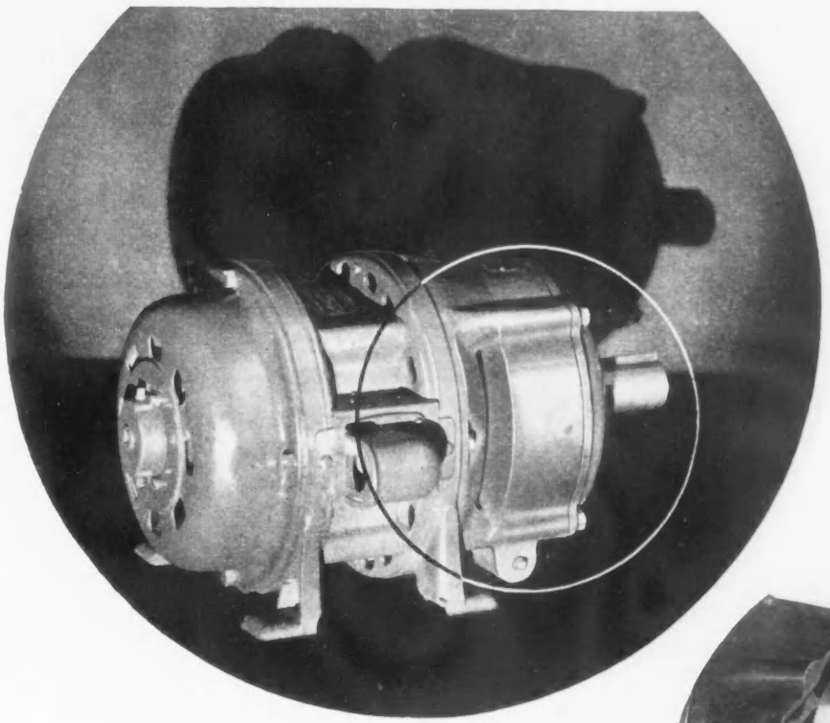
THE GEOMETRIC TOOL COMPANY

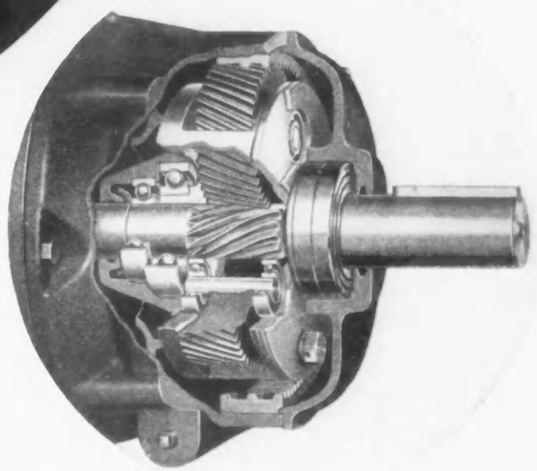
New Haven, Conn.

Also Manufacturers of Collapsing Taps, Solid Adjustable Taps and Threading Machines

G-E GEAR-MOTORS

EFFICIENT - - COMPACT - - ECONOMICAL





THE G-E GEAR-MOTOR is a combination of a motor and a speed reducer, built into a single, compact unit to deliver the desired low speed, direct at the drive shaft. It is only slightly larger than an ordinary motor and is easy to install.

The GEAR-MOTOR combines the economy of a standard, normal-speed, general-purpose motor and the efficient speed reduction of internal helical gearing running in oil. The GEAR-MOTOR delivers the full rated horsepower of the motor at the output shaft.

Information on this complete line of GEAR-MOTORS can be obtained from the nearest G-E sales office or G-E Motor Dealer, or from General Electric Company, Schenectady, New York.

STANDARD RATINGS

600 to 13 Rpm.
Polyphase, 3/4 to 75 hp.
Single-phase, 3/4 to 5 hp.
Direct Current, 3/4 to 7 1/2 hp.

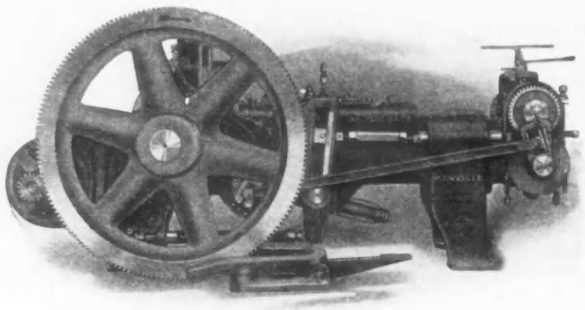
Other speeds and horsepower ratings can be furnished on request. Mechanical modifications are available, such as flange mounting, vertical motors, etc.

Speed adjustment can be obtained by selecting a motor with the necessary electrical characteristics.

201-229

GENERAL ELECTRIC

MANVILLE COLD HEADERS



Manville Double Stroke Solid Die Cold Headers are fast, accurate production machines for cold forging cap, lag, machine screw blanks, rivets and special headings. Submit your heading problems.

We also build

Bolt Trimmers
Cap Screw Trimmers
Thread Rollers
Nut Machines
Screw Slotters
Wire Formers
Power Presses
Ball Blank Headers

and various other special machines for the rapid and economical production of Cold Forged Products.

THE E. J. MANVILLE MACHINE COMPANY

HOME OFFICE AND WORKS—WATERBURY, CONN., U. S. A.

Branch Offices: 1209 Swetland Building, Cleveland, Ohio
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Bushings ▪ Bearings ▪ Sleeves ▪ Cylinder Liners
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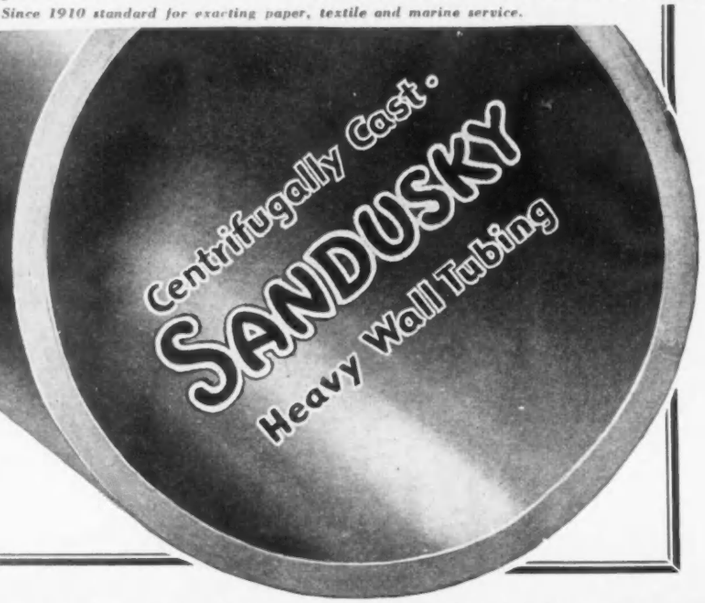
Bronze ▪ Brass ▪ Copper ▪ Monel ▪ Aluminum

4"-46" diameter, lengths to 330", ¼"-3" wall
Machined to specifications in short or long lengths.

Made of tested, specified ingot—no scrap.
Dense, sound, homogeneous structure.
Straight, round, concentric, accurate.
No patterns required—none used.

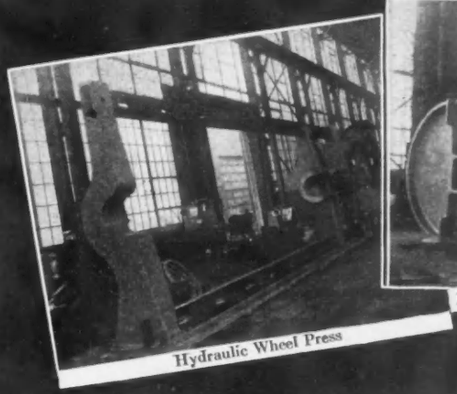
Product of 20 years metallurgical research.
Compares favorably with machined forgings.
Costs little more than ordinary castings.
Gaining national and world-wide recognition.

Since 1910 standard for exacting paper, textile and marine service.

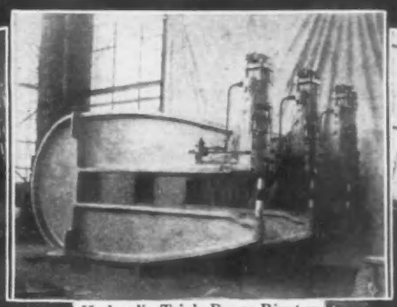


Illustrated Booklet 508

The **Paper & Textile Machinery Co.**
Sandusky Ohio.



Hydraulic Wheel Press



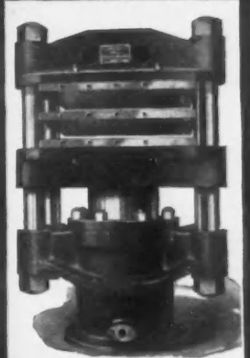
Hydraulic Triple Power Riveters

Hydraulic Straightening Press

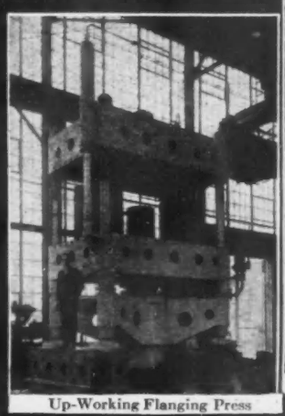
Multiple Opening 4-Cylinder Steam Platen Press

ABILITY *plus* RELIABILITY

THE successful designing and building of such representative machines as these are the result of intelligently organized ingenuity founded upon the extensive knowledge gained in more than a century of specialized engineering experience—hence the *reliable performance* of our engineers in meeting their problems squarely—and the *reliable performance* of Wood-built machinery in many lines of industry.

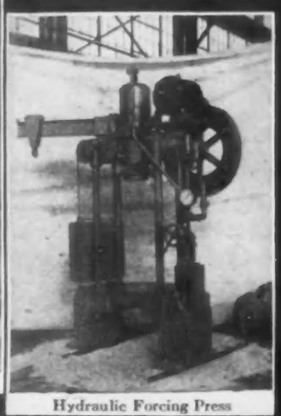


2-Opening Steam Platen Press

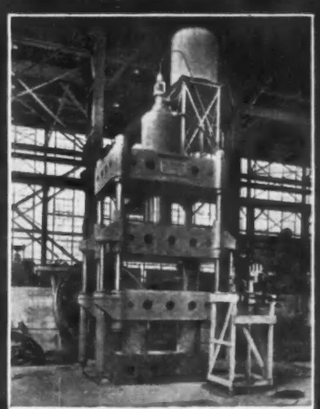


Up-Working Flanging Press

Automatic Gas Producer



Hydraulic Forcing Press



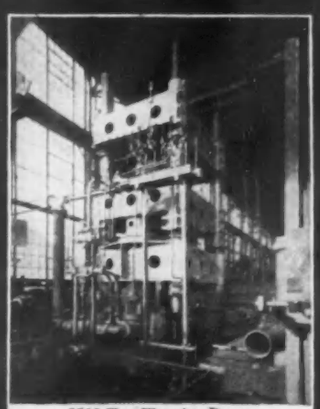
Down-Working Flanging Press

R. D.
WOOD
& COMPANY

PHILADELPHIA
ENGINEERS—IRON FOUNDERS—MACHINISTS
In business continuously since 1803

Designers and Builders of
Hydraulic Machinery—Automatic Gas Producers—Gas Washers—General Machinery of every Description

Cast Iron Pipe—SAND-SPUN (Centrifugally Cast) and Pit Cast—Mathews Fire Hydrants—Gate Valves



2500-Ton Flanging Press

SERVING MODERN SALES AND PRODUCTION NEEDS

● In designing new products and redesigning old ones to fit the new day market, many manufacturers of wide diversification have turned to Thomastrip, as the ideal material for modern sales and production needs. » » » Strength, high ductile quality which allows deep stamping and severe forming operations, and a variety of finishes, including non-flaking, rust-resistant zinc, are combined at low cost in Thomastrip. Specialized production insures uniformity and prompt service always. » » » Check Thomastrip for your product. It's worth careful investigation.

SEND FOR TEST SAMPLES—Specify width, gauge and finish desired.

The THOMAS STEEL CO.
WARREN OHIO

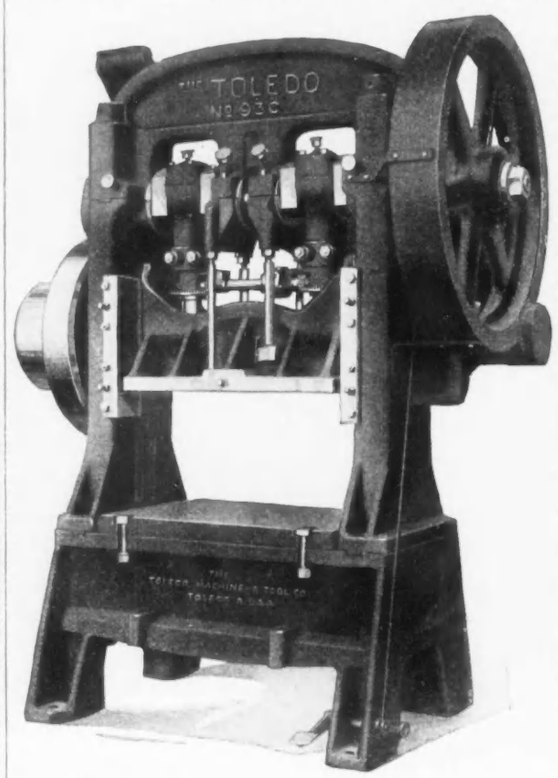
HEADQUARTERS FOR SPECIALIZED
PRODUCTION COLD ROLLED STRIP STEEL

THE

"Toledo"

Straight Column—Single Action

DOUBLE CRANK PRESSES



DESIGNED for a general line of cutting out, forming, reducing, and deep-drawing operations. They can also be used for multiple gang punching or perforating, operating several dies in series, or duplicate dies in gangs.

Built in over 200 different sizes, weighing from 5,000 to 850,000 pounds, for a wide variety of uses.

PRESSES FOR EVERY PURPOSE
Over two thousand patterns from which to choose.

THE TOLEDO MACHINE & TOOL CO.

Engineers, Founders and Machinists on Equipment for Sheet Metal Products

TOLEDO, OHIO, U. S. A.

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549 W. Washington Blvd.

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CLEVELAND OFFICE
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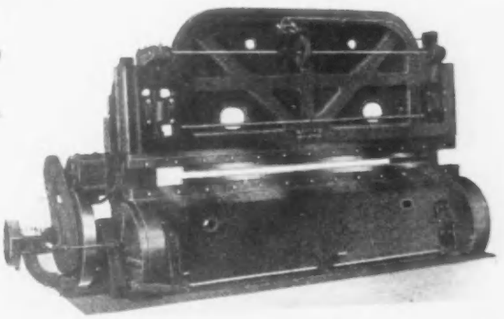
THE RAFTER PRESS-BRAKE

(Patented)

is self-contained and has only two major members . . . . . .



There are only two major members of the Rafter Press-Brake—the base and the ram. The absence of side housings and crown eliminates dead weight and permits the concentration of weight and strength in the working parts where it is effective in resisting deflection and producing work of the highest accuracy.

The entire machine is mounted on the heavy, rugged bed, scientifically designed for maximum strength and rigidity to resist deflection and prevent weaving. There are no side housings to deflect and throw the ram and dies out of alignment. The uprights guiding the ram are securely fastened to the base and have only one function, viz., to keep the ram in perfect alignment with the bed. The uprights carry none of the operating mechanism (this is all mounted in or on the bed) and thus are subject to no working strain whatever.

Complete details of the revolutionary Rafter Press-Brake can be obtained, without obligation, upon application to

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Rolls	Gears
Rolling Mills	Mill Pinions
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Catalogs, Specifications or Engineering Data on request

FARREL-BIRMINGHAM CO., INC.

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Alliance Products

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Up to 430 tons capacity
STRIPPING CRANES
Up to 320 tons capacity
COMBINATION CHARGERS and STRIPPERS
Up to 200 tons capacity

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Ingot Strippers
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271 of 100 Tons Capacity and over

LADLE AND STANDARD CRANES

59		100 tons
2	WORM DRIVEN Ladle..	100 tons
2		115 tons
6	WORM DRIVEN Ladle..	125 tons
45		125 tons
30		150 tons
3	WORM DRIVEN Ladle..	150 tons
6	WORM DRIVEN Ladle..	160 tons
2	WORM DRIVEN Ladle..	165 tons
4	WORM DRIVEN Ladle..	175 tons
27		175 tons
3	WORM DRIVEN Ladle..	200 tons
4		200 tons
5		225 tons
1		250 tons
3	WORM DRIVEN Ladle..	250 tons
3	WORM DRIVEN Ladle..	275 tons
1		275 tons
1		300 tons
3		430 tons

STRIPPING CRANES

8		100 tons
1		125 tons
21		150 tons
19		200 tons
1	Single Ram,	320 tons

COMBINATION CHARGERS AND STRIPPERS

3	100 tons
1	125 tons
3	150 tons
4	200 tons

Give Us the Runway and We will Lift the World

THE ALLIANCE MACHINE CO.

ALLIANCE, OHIO, U.S.A.
ENGINEERS AND BUILDERS

Cross Section showing how hexagon nut fits snugly into shell

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ACORN NUTS

Ferry Patented

Stainless Steel Covered

A WONDERFUL OPPORTUNITY to hide unsightly exposed bolt ends by the use of Ferry Patented Acorn Nuts is attracting the attention of engineers throughout the country. The neat, graceful appearance of these Acorn Nuts—their ability to lend a finished appearance to the product—is as great as the cost is small.

THE FERRY STEEL COVERED ACORN NUT

The Ferry Steel Covered Acorn Nut has the advantage of permitting painting, galvanizing, Parkerizing, Sherardizing, Cadmium-plating, Nickel-plating and Chromium-plating, burnishing, polishing and buffing.

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The Ferry Brass Covered Acorn Nut is recommended where Nickel-plating and Chromium-plating on brass is desired. It has the non-corrosive feature which is a strong advantage.

THE FERRY STAINLESS STEEL COVERED ACORN NUT

The Ferry Stainless Steel Covered Acorn Nut is recommended where no plating is desired. It is a stainless steel cover all the way through. It is furnished with steel or brass hexagon nut insert at exceedingly small cost.

Hide Unsightly Exposed Bolt Ends

Write for samples, sizes, styles and prices

THE FERRY CAP & SET SCREW CO., CLEVELAND, OHIO

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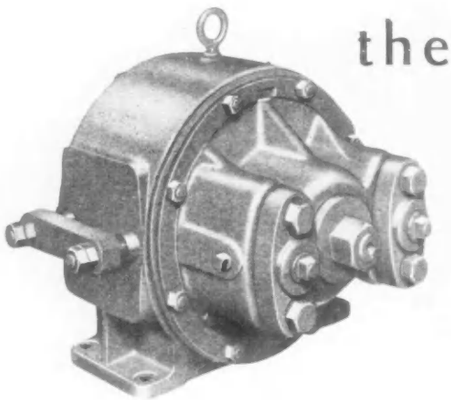
BUY IT FROM THE DISTRIBUTOR

Here is a robot to serve you—

the HELE-SHAW PUMP



HELE-SHAW PUMP

Write for Hele-Shaw Catalogue or outline your transmission problems and let our engineers help to solve them.

It's just a piece of machinery, but it acts as though it were human. The Hele-Shaw Pump adapts itself to the requirements of the most varied kinds of automatic machinery. Whatever their cycle of operation may be, controls can be provided so that the Hele-Shaw will transmit power precisely as it may be required.

But the Hele-Shaw does more than that . . . . it meets emergencies as they arise. If unexpected resistance is encountered, the Hele-Shaw builds up hydraulic pressure to overcome it, but before the danger point where tool breakage might occur is even approached, this almost human pump stops the machine, or reverses it, or causes it to operate with a shortened stroke, according to circumstances and the type of control.

Transmitting power with liquid smoothness by means of oil under pressure, the Hele-Shaw Pump can be fitted with controls operated by the pressure itself, or by suitable mechanical or electrical devices. A Hele-Shaw Pump and Hele-Shaw Fluid Motor form a variable speed transmission for rotary motion that provides an infinite number of speeds in either direction between zero and the maximum speed for which the transmission is designed.

AMERICAN FLUID MOTORS COMPANY

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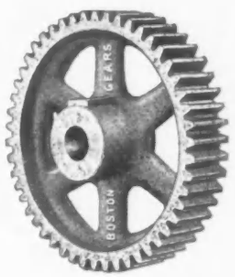
A TYPE FOR EVERY PURPOSE

from stock!

DELIVERED ANYWHERE IN THE U. S. WITHIN A FEW HOURS!



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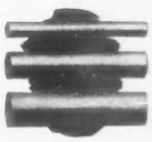
NEW and BIGGER LIST OF BUNTING 'In Stock' Products



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HERE are eight solid pages of money-saving opportunities . . . a new and larger list of Bunting "In Stock" Bushing Bearings, completely machined and finished, ready for assembly . . . a complete list of stock sizes of Bunting Phosphor Bronze Cored and Solid Bars . . . full information about the new Bunting Lead Base Babbitt...and other Bunting products in every-day use for production and maintenance operations. Write for your copy of this big new Bunting Catalog of products which you can obtain instantly and at prices far below all previous quotations.

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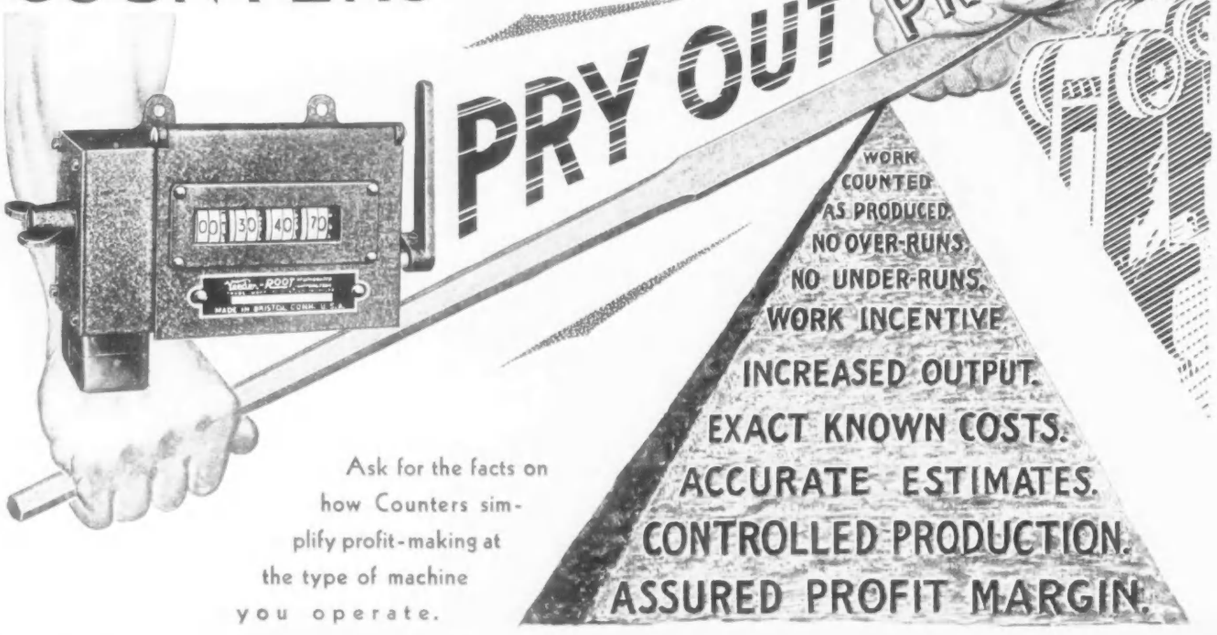
Wyandotte Metal Cleaners

SUSTAINED CLEANING STRENGTH

■ One thing which proves the efficiency and economy of Wyandotte Metal Cleaners is the fact that they retain their cleaning strength in solution over surprisingly long periods of time. ■ This means more uniform cleaning, fewer rejects, lower costs, and more closely following of time allowances. ■ Wyandotte offers you a full line of specialized Metal Cleaners and the services of men who are competent to consult with you regarding their correct use. ■ Write for information.

THE J. B. FORD COMPANY
Wyandotte, Mich.

Veeder-Root COUNTERS



Ask for the facts on how Counters simplify profit-making at the type of machine you operate.

BUILDERS OF COUNTERS Veeder-Root INCORPORATED HARTFORD, CONN. FOR EVERY PURPOSE

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TRI-MARK
TRADE MARK

HOLLOW SCREWS

of

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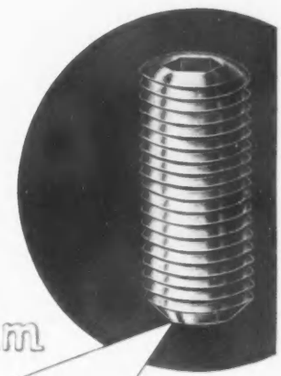

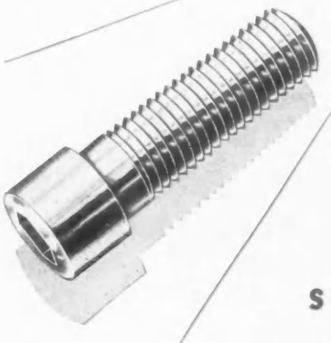

Their strength saves your money *on the* OPERATING end

Screws made of this steel, with Allen *heat-treatment*, can save you no money on the purchasing end. But they save you more on the *operating* end than *ANY* screws save on the purchasing end. . . You have to translate hollow screw breakage into breakdowns of operating machines and shop schedules. For a "shaded" price on your hollow screws, are you buying trouble in the shop?

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"45 seconds for the first cut"

In one of many recent "actual service" tests of the new Victor "Moly" GOLDSTEEL Hack Saw, it walked through a piece of one-inch tool steel in only 45 seconds at 80 strokes per minute—as compared to 65 seconds for a well-known competitive blade. Then, at 120 strokes per minute, Victor "Moly" made the second cut in 1 minute and 20 seconds as compared to 2 minutes and 25 seconds.

Standards of metal-cutting performance have been revolutionized by this new blade —*and it costs only about one-half!*

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MOLYBDENUM
HEAVY DUTY—EXTRA VALUE
HACK SAWS

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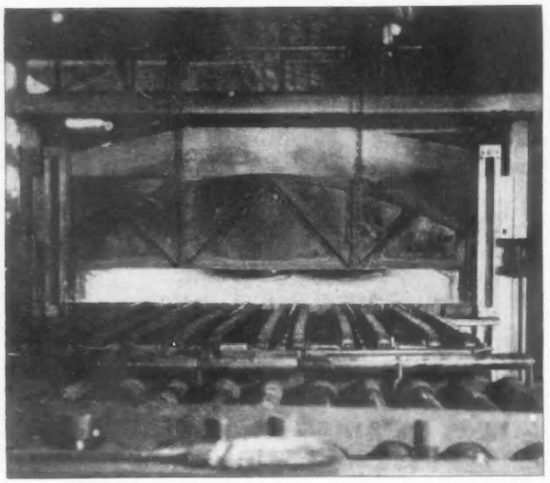

"Whew! But it's Hot."

A few degrees more or less mean little to you except to make you uncomfortable.

In the rolling of GOHI, however, temperature control is one of the most important factors.

And in the Newport Mills every precaution and safeguard is taken to maintain right temperatures—another indication of the scientific control that is exercised at every step from the charging of the furnace until the finished sheet is ready for delivery to you.

Such control in combination with the chemical analysis of the metal itself—pure iron alloyed with the right amount of copper—is the reason for the unexcelled life and economy of GOHI Sheet Metal.

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ROLLING MILL COMPANY
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PERFORATED METALS

Various metals, infinite variety of perforation and spacing — but when made by ERDLE, all gratifyingly cheap and dependably uniform, smooth, flat, finished.

Our service department will be glad to cooperate with you.

A stock of Perforated Metals for machinery guards always on hand.

Aluminum, Tin, Zinc, Brass, Copper, Steel, and other metals and materials.

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Large stocks of all metals always in hand ready to punch for any arrangement of perforations.

Sixty-one years of manufacturing perforated metals for every conceivable purpose assures satisfaction.

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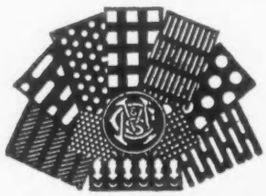

TIN, STEEL, COPPER, ALUMINUM, BRONZE, BRASS, ZINC, ANY METAL, ANY PURPOSE

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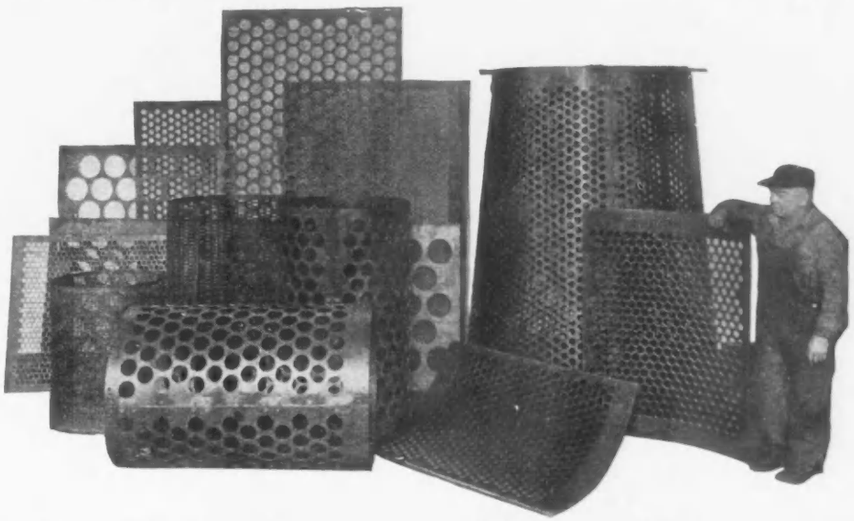
Aluminum Tin-Plate Nickel-Silver
and all other metals.



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To Your Order
For
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FOR

HEAVY PLATE BENDING AND FORMING

Smooth power application.
Quiet operation because of lack of gear trains, friction clutches and rotating parts.
Requires minimum maintenance.
No press adjustments for various thicknesses of plate or types of bends, except space between anvils.
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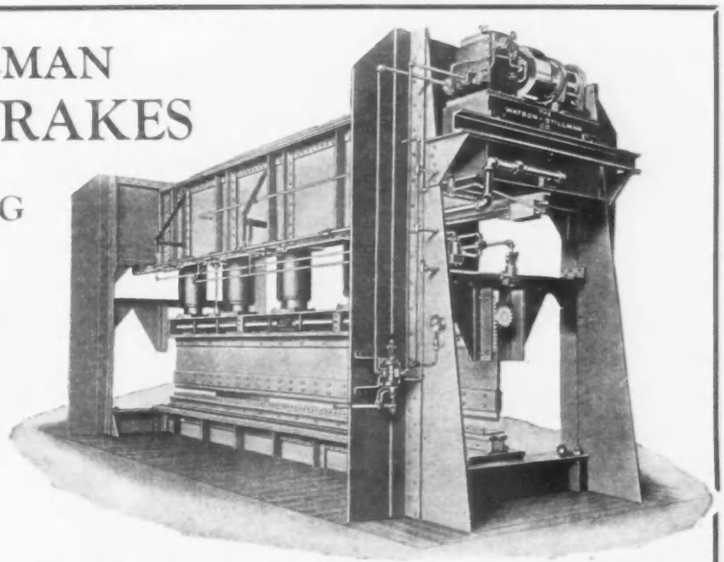

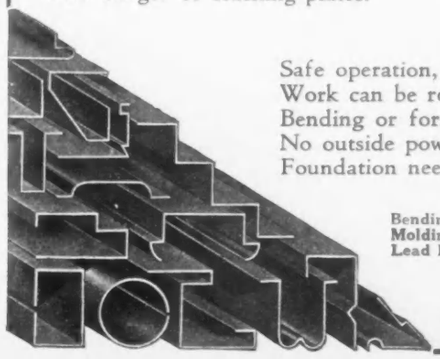

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Work can be rolled into and out of machine from floor.
Bending or forming is completely visible to operator at all stages.
No outside power plant necessary. Electric service only is required.
Foundation need be designed to take care of dead weight only.

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The Hurlbut-Rogers Cutting-off Machine
Will Double Your Output
Equipped with two tools, cuts twice as fast.
Made in six sizes—two types of drive.
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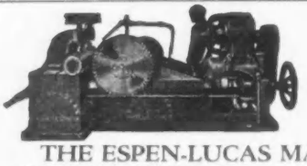

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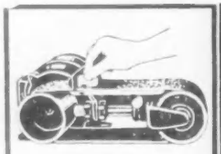
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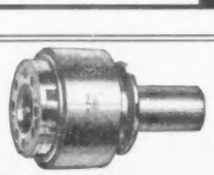

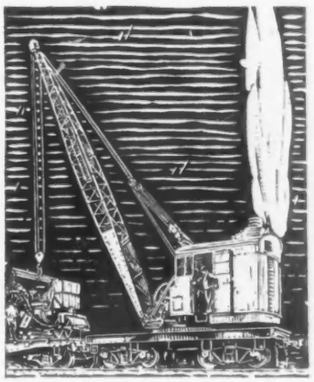

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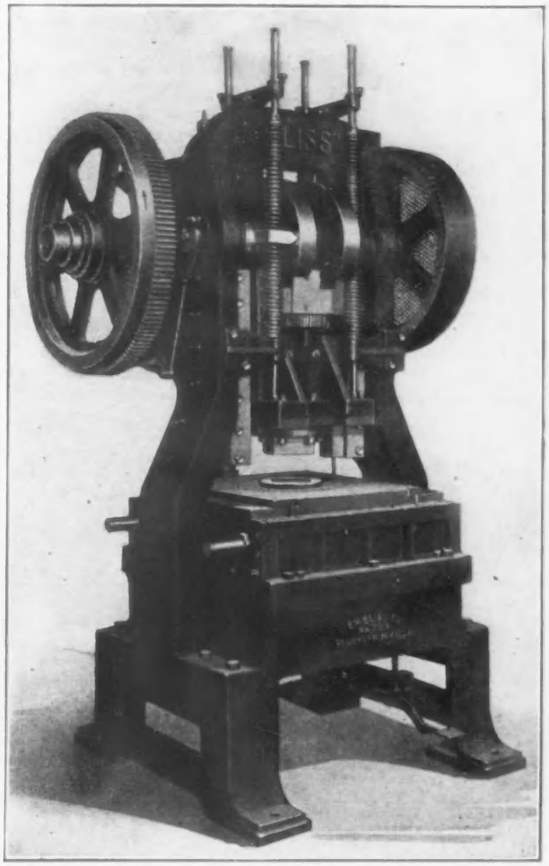
BUCKETS
CONVEYORS



FLAT EDGE TRIMMERS

To trim quickly and accurately a simple, straight edge or an irregularly notched edge, to do this in a simple operation and to accomplish it with dies which are simple in construction, has proven practical, easy and highly economical in Bliss Flat Edge Trimmers.

A short motion front and a back and a right and left motion imparted to the die results in a clean and square sheared edge without joint marks or deformation.

A large number of Bliss Flat Edge Trimmers are effecting considerable economy in the manufacture of silverware, hardware, brass goods, electrical parts and miscellaneous lines.

Wherever Sheet Metal Parts Are Made

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"HEAT PROOF"
COMPRESSION RIVETER
DIES

Made from our special Heat Proof heat-resisting steel. Can be used continuously without cooling and will outlast four or more carbon steel dies.

Send us your specifications

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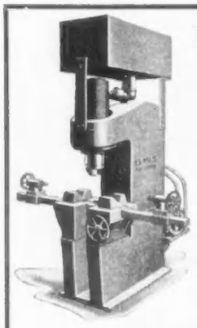

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Shaft Straightening and Assembling

Accurate and Sensitive.
Single Control of Pressure and Movements.
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Automatic Stop on "Up Stroke"

A General Purpose Press with removable Bending Nose and Blocks.

THE CHARLES F. ELMES HYDRAULIC MACHINERY SPECIAL MACHINERY ENGINEERING WORKS
SINCE 1851 — 81 YEARS
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Save All Forgings, 70% of Grinding

FOR every operation of Lathe, Planer, Slotter and Shaper. Over 10 modifications of shape and size.

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ARMSTRONG BROS. TOOL CO., CHICAGO

Look for this Mark —the quality sign of "The Tool Holder People"

MAYBE it's in the CLASSIFIED SECTION

If you can't find it in the regular advertising pages of The Iron Age—look in the Classified Sections at the back of this book.

THE CLASSIFIED SECTIONS *of* THE IRON AGE

Emery Wheel Dressers

Two Sizes CUTTERS Nos. 1-2

We make the regular Huntington (Pattern) for all sizes. Roughing for Nos. 1 and 2. Paragon for No. 1 only.

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HELWIG MFG. CO.
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Powerful, Sturdy, of Few Parts. Cut with Ease, Close to Work, leaving a Neat Job. Knives cannot wabble. Capacities from ⅜" to save. Also HELWIG Pneumatic and other Hand-operated Time- and Labor-saving Tools having Unique Advantages.

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AUTOMATIC FEEDS
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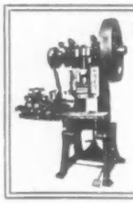
THE V & O PRESS CO., HUDSON, N. Y.



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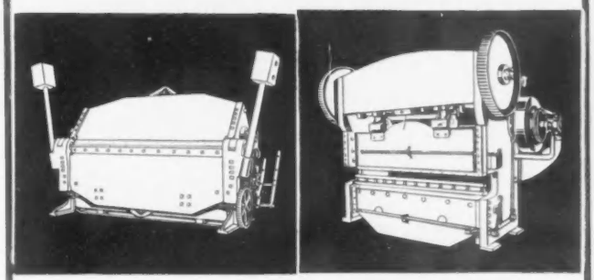

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COLD ROLL FORMING MACHINERY
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AMERICAN TUBE AND STAMPING PLANT
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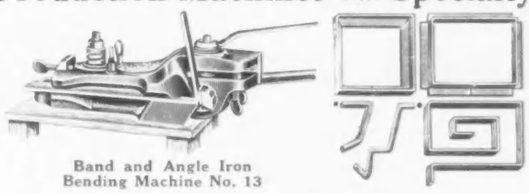

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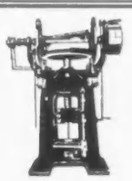
BETHLEHEM STEEL COMPANY General Offices: Bethlehem, Pa.
BETHLEHEM



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Light and heavy machinery for all classes of sheet metal, plate and structural work.
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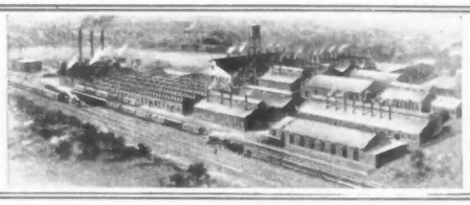

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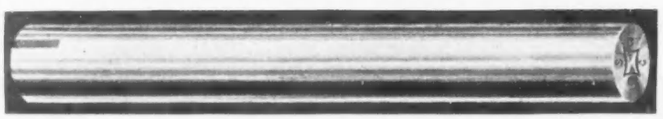
TURNED *and* GROUND SHAFTS
"Ground to Micrometer Accuracy"



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Desired Quality for Forming and Drawing

Uniform quality in widths from ½" to 19"; and gauges from .002" to .500"; special tempers for forming and high class stamping work.

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Hot and Cold Rolled Strip Steel in regular carbon steel and rust resisting metals in Chrome and Chrome-Nickel analysis—also SuVeneer Metal.
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26TH YEAR
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MAGNET STEEL
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Made to any S. A. E. steel specification. Can furnish forgings completely machined where desired.

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Annite may be CAST TO SHAPE for dies and tools, and but little machining is required. It is air hardening and wears 3 to 6 times longer between grinds. Also available in the form of bars.
THE BISSETT STEEL CO., Inc., Cleveland • Cincinnati
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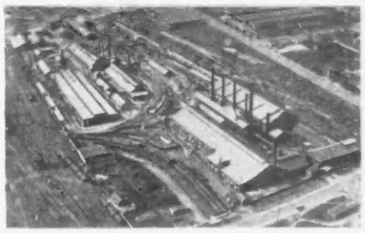
From Our Own Steel to Finished Product

You'll get better service from our big plant on forgings in any size, any specification, any analysis, any quantity!



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THE **WEST STEEL CASTING CO.**
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1 POUND to 10 TONS
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ELECTRIC STEEL CASTINGS
from ¼ to 2000 lbs. in Quantities
The INDUSTRIAL STEEL CASTING CO.
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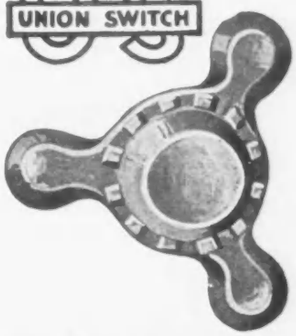

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1932 marks the beginning of a period of constructive economy. The process of chopping down expenses among manufacturers generally has about reached the end of the rope. ▲ From now on your budget must be balanced through economy achieved by superior accomplishment. Using high grade forgings is one step in this direction, and the successful experience of 49 years by Union Switch & Signal is your guarantee of good forgings that will be a credit to your finished product. ▲ Up to 500 lbs. in any alloy or heat treatment.

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UPSET, DROP and COIN PRESSED
ANY ANALYSIS — ANY QUANTITY
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WELDLESS RINGS .. SHAFTS
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to any specification
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LABORATORY-CONTROLLED STEEL STAMPINGS . . .

What is your Stamping Problem?

A Parish customer wanted some railway journal box liners that would resist abrasion, and put the problem up to Parish.

Problems like this cannot be intelligently solved without the aid of a chemical and physical laboratory, and so we drew upon the experience of the Parish laboratory.

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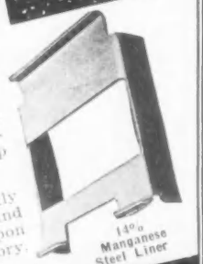
Buy your stampings from Parish—mild steel or alloy—and cash in on our experience.



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that meet the specifications of the most particular users are not made by any combination of good luck.

But 63 years of experience, development of equipment, processes and personnel, have put this company in a position to supply castings of uniform excellence in any quantity and to any specifications.

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DIE CASTINGS

A steadily increasing number of large manufacturers come to us for their Die Castings.

"If You Value Service and Real Cooperation Let Us Quote"

STERLING DIE CASTING CO., Inc.
749—39th Street, Established 1916 BROOKLYN, N. Y.

RICHMOND MALLEABLE CASTINGS

An average of all heats poured during 1931—

Yield Point	Tensil Strength	Elongation
37056	55978	21.26%
Lbs. per square inch	Lbs. per square inch	in 2 inches

RICHMOND MALLEABLE CASTINGS CO., RICHMOND, INDIANA

STAMPINGS

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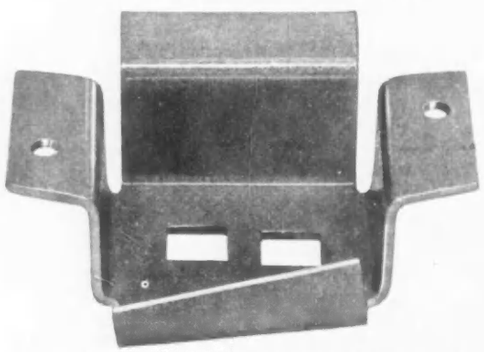

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We Will Design and Build

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"THE WORLD'S LARGEST PRODUCER OF WASHERS"
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Castings of Guaranteed Quality
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Prompt Service and Shipments

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QUALITY AND QUANTITY PRODUCERS
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HEAVY — MEDIUM
STAMPINGS
SEND SAMPLES OR BLUE PRINTS FOR ESTIMATES
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SHEET METAL WORK

Small orders solicited as well as quantity production

Our facilities consist of shearing and forming equipment up to 10' and 3/16", large number of presses, spot welders, oxy-acetylene and arc welders, also very complete japanning equipment.

Plant is now specializing in automotive sheet metal work. *Send us drawing or samples for prices.*

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When in doubt —*Stamp It*

WORCESTER STAMPED METAL © · QUALITY · STAMPINGS

Castings are heavier than the stamped piece—always, and not so strong. Substantial savings are possible by substituting the stamping process for that of the casting if size and purpose permits.

Our organization has experienced 40 years in the business of stamping parts from sheet metal—steel—brass—copper and aluminum and is qualified to advise with you as to which is the better for your particular purpose. Your blue prints will furnish the necessary information to us. Let us look them over; you may benefit by our suggestions.

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Successors to W. & S. Mfg. Co. ESTABLISHED 1883 Worcester, Mass.
Philadelphia Representative: H. L. Hess Co., 6816 Market St.

What Are Your Stamping Problems?

If it can be made from Sheet Metal, The Crosby Company can make it. Quality and Service guaranteed by thirty-six years of uninterrupted experience in Sheet Metal Stamping, exclusively, for nearly a hundred different industries. Can you afford to omit us as a stamping source?

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Better Shapes at a Lower Cost

If you use pinion rods, or any irregular and special shapes in Steel, Brass, Copper, Bronze or Nickel Silver, let us make them for you.

Our method of manufacture insures strong, accurate shapes at a cost far cheaper than you could machine them.

May we submit prices for comparison?

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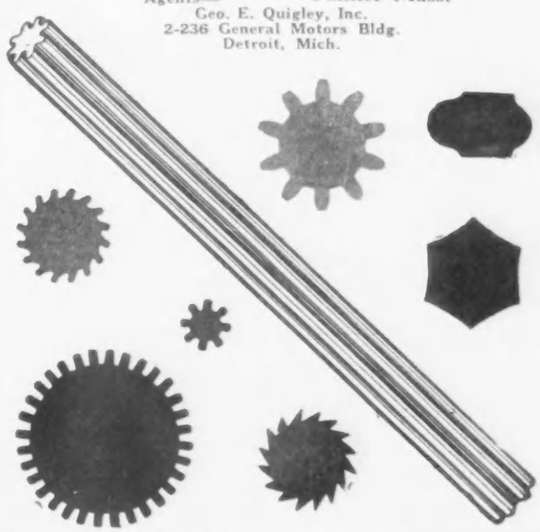

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Stampings

Right as to price. Right on time.
Quotations gladly furnished.

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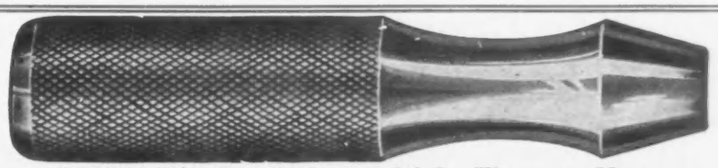
Expert Work at Low Cost

THOMAS SMITH CO.
286 GROVE ST., WORCESTER, MASS.



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If Your Screw Product Requirements Are Unusually Exacting—

call on Olson. Many manufacturers rely upon our modern facilities and twenty-five years' experience when they want work of unusual quality.

Let us show you what we can do, in steel and brass up to 2¼" in diameter.

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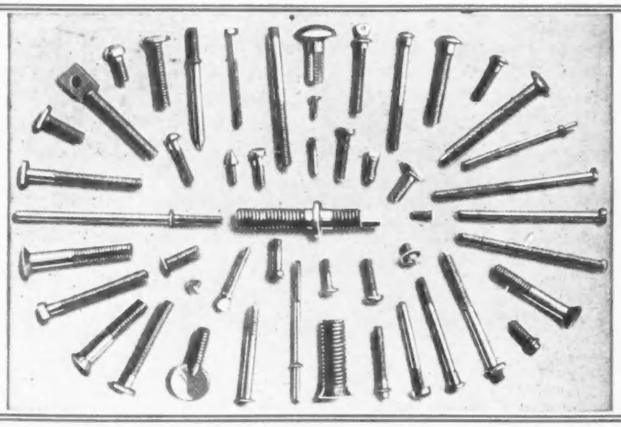
Machine Screws **Special Screws**
Special Studs **Machine Screw Nuts**

If you want real service, let us know your needs. Progressive Manufactured Products are made on both a quality and price basis. Their uniformity is your guarantee of speedier assembly.

Do you know about the savings made possible by our special heading process? Better get in touch with us.

The PROGRESSIVE MFG. CO.
TORRINGTON, CONN., U. S. A.
IN STOCK AT ALL TIMES—
Standard Machine Screws; Machine Screw Nuts; Interchangeable Bolts and Nuts made strictly to A.S.M.E. tolerances



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281,500 LBS.

that's the ultimate strain per square inch of a ¼" "Unbrako" Socket Head Cap Screw according to the Olsen Testing Machine—or put it another way, it took 3½ tons to pull a ¼" "Unbrako" apart.

Free samples—Complete stocks. Sold by Dealers Everywhere.

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THUMB NUTS and THUMB SCREWS
MALLEABLE IRON

Formerly made by
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We carry a large stock and variety of styles and sizes of thumb nuts and thumb screws, threaded and blank.

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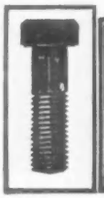

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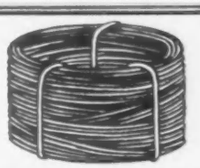

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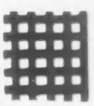

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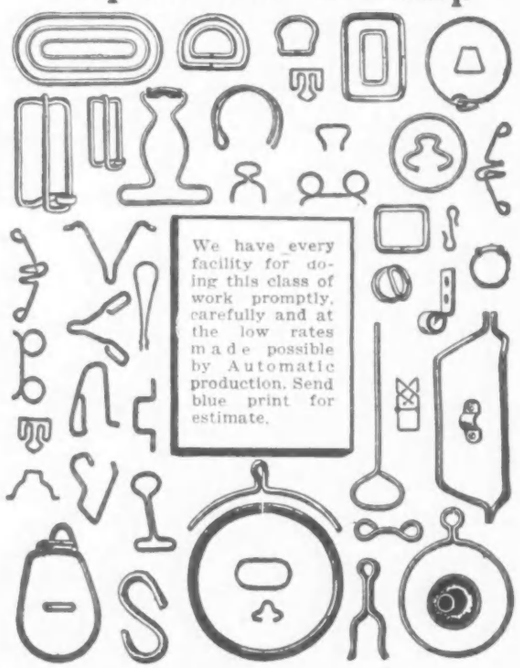

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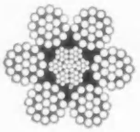
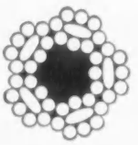
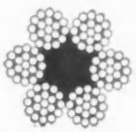
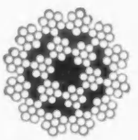
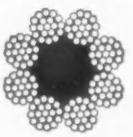
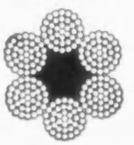
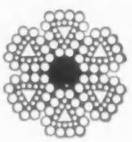

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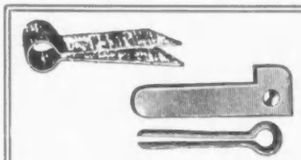

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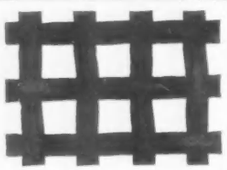

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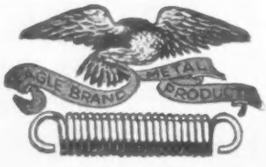

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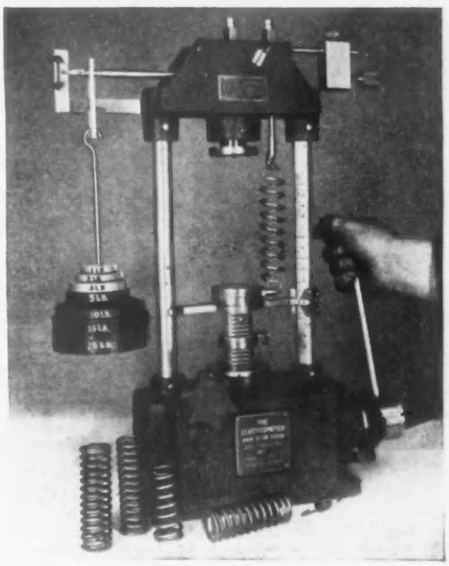

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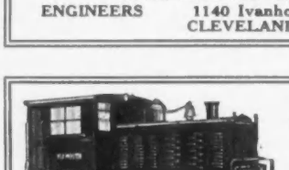

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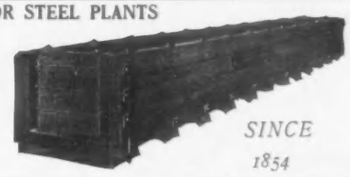

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Timken Steel & Tube Co., The, Canton, O.

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BELT LACER
Clipper Belt Lacer Co., Grand Rapids, Mich.

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Chicago (Ill.) Rawhide Mfg. Co., 1313 Elston Ave.

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Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

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Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.

BILLETS—Carbon Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Carbon Vanadium Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Chrome Nickel Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Chrome Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Die Block Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Forging
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Bethlehem (Pa.) Steel Company.
Central Iron & Steel Co., Harrisburg, Pa.
Harrisburg (Pa.) Pipe & Pipe Bending Co.
Midvale Co., The, Nicetown, Phila., Pa.
Republic Steel Corp., Youngstown, Ohio.

BILLETS—Nickel Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Re-Rolling
Andrews Steel Co., The, Newport, Ky.

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Bethlehem (Pa.) Steel Company.
Central Iron & Steel Co., Harrisburg, Pa.
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Chace, W. M., Valve Co., Detroit, Mich.

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Chicago (Ill.) Rawhide Mfg. Co., 1313 Elston Ave.
Union Switch & Signal Co., Swissvale, Pa.

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BLOCKS—Creosoted
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Spencer Turbine Co., Hartford, Conn.

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National Machry. Co., Tiffin, Ohio.

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Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

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Inland Steel Co., Chicago.

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Bethlehem (Pa.) Steel Company.
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Watson-Stillman Co., The, 163 Aldene Road, Roselle, N. J.

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Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Seymour (Conn.) Mfg. Co.

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Hayward Co., 50 Church St., N. Y. C.

BUCKETS—Electric Motor
Hayward Co., The, 50 Church St., N. Y. C.

BUCKETS—Orange Peel
Hayward Co., The, 50 Church St., N. Y. C.

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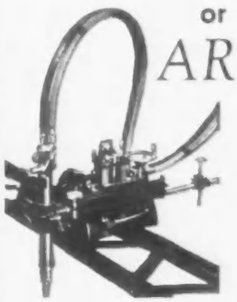

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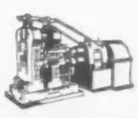
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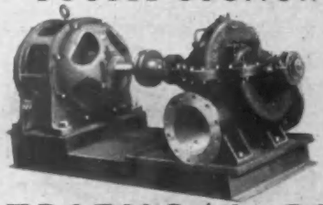
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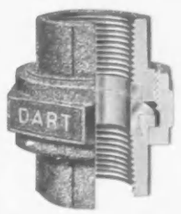

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Curtis Pneumatic Mch. Co., St. Louis, Mo.
Duncan (Mich.) Hoist & Mach. Co.
Northern Engng. Wks., 212 Chene St., Detroit.
Sullivan, R. & E. Co., Wilkes-Barre, Pa.
Wright Mfg. Co., Bridgeport, Conn.

HOISTS—Chain
Wright Mfg. Co., Bridgeport, Conn.
Yale & Towne Mfg. Co., Stamford, Conn.

HOISTS—Electric
American Engng. Co., Aramingo & Cumberland Sts., Philadelphia.
Box Crane & Hoist Corp., Phila.
Detroit (Mich.) Hoist & Mach. Co.
Northern Engng. Wks., 212 Chene St., Detroit.
Payne, N. B., & Co., 103 West 58th St., N. Y. C.
Roger Crane & Hoist Works, Inc., Readville, Mass.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Sprague Electric Motors, Monroe Falls, N. Y.
Wright Mfg. Co., Bridgeport, Conn.
Yale & Towne Mfg. Co., Stamford, Conn.

HOISTS—Electric Traveling
American Engng. Co., Aramingo & Cumberland Sts., Philadelphia.
Cleveland Electric Tramrail, Wickliffe, O.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

HOISTS—Monorail
American Engng. Co., Aramingo & Cumberland Sts., Philadelphia.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

HOOKS—Wire
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Tinsbeiner, A. H., & Co., Binghamton, N. Y.

HOOPS—Wire
American Steel & Wire Co., Chicago.

HOOPS & BANDS
Sharon (Pa.) Steel Hoop Co.

HOSE—Rubber
Goodrich, B. F., Rubber Co., Akron, O.

HYDRANTS—Fire
Wood, R. D., Co., Philadelphia.

HYDRAULIC FEEDS
Vickers, Inc., Detroit.

HYDRAULIC MACHINERY
American Fluid Motors Co., 2310 Aramingo Ave., Philadelphia.
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Bethlehem (Pa.) Steel Company.
Chambersburg (Pa.) Engng. Co.
Elliott, Chas. F., Engrg. Wks., Chester.
Lake Erie Engrg. Corp., 88 Kennedy St., Buffalo, N. Y.
Morgan Engineering Co., Alliance, O.
Watson-Stillman Co., 204 Alling Rd., Roselle, N. J.
Wood, R. D., Co., Philadelphia.

INGOT MOLDS
Bethlehem (Pa.) Steel Company.
Sheffield Furnace Co., Pittsburgh.
Shenango-Penn Mold Co., Pittsburgh.
Snyder, W. P., & Co., Pittsburgh.

INGOTS—Aluminum
Eddy-Perforating Co., Rochester, N. Y.

INGOTS—Phosphor Bronze
Phosphor Bronze Smelting Co., Philadelphia.

INSTRUMENTS—Recording
Bristol Co., Waterbury, Conn.

IRON—Chain
Bethlehem (Pa.) Steel Company.

IRON—Genuine Open Hearth Iron
Sheffield Rolling Mill Co.

IRON—Genuine Wrought
Reading Iron Co., Philadelphia.

IRON—Rustless
Ludlum Steel Co., Watervliet, N. Y.

IRON—Staybolt
Bethlehem (Pa.) Steel Company.
Burgen Iron Co., The, Troy, N. Y.

IRON—Stainless
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.

JACKS—Hydraulic
Watson-Stillman Co., The, 204 Alling Road, Roselle, N. J.

JIGS, FIXTURES, TOOLS, ETC.—See Tools, Jigs, Fixtures, Etc.

KEYS—Riveted
Western Wire Prods. Co., St. Louis, Mo.

LACING—Belt, Rawhide or Leather
Chicago (Ill.) Rawhide Mfg. Co., 1312 Elston Ave.
Clipper Belt Lacer Co., Grand Rapids, Mich.

LAMPS—Mercury Vapor
General Electric Vapor Lamp Co., Hoboken, N. J.

LATHE DOGS
West Steel Casting Co., The, Cleveland.

LATHES—Automatic
Baird Machine Co., Bridgeport, Conn.
Jones & Lamson Mch. Co., Springfield, Vt.
Pratt & Whitney Co., Hartford, Conn.

LATHES—Bench
Pratt & Whitney Co., Hartford, Conn.

LATHES—Brass
Warner & Swasey Co., The, Cleveland.

LATHES—Chucking
Jones & Lamson Mch. Co., Springfield, Vt.
Warner & Swasey Co., The, Cleveland.

LATHES—Engine
Schiess-Defries, A.-G., Düsseldorf, Germany.

LATHES—Roll
Mesta Machine Co., Pittsburgh.
United Engine & Foundry Co., Pittsburgh.

LATHES—Second-Hand
Bolzinik Bros., Inc., New Haven, Conn.
Eastern Mchy. Co., Conn.
Miles Mchy. Co., Saginaw, W. S., Mich.
Simmons Mch. Tool Corp., Albany, N. Y.

LATHES—Toolroom
Pratt & Whitney Co., Hartford, Conn.

LATHES—Turret
Burdon & Oliver, Cleveland.
Jones & Lamson Mch. Co., Springfield, Vt.
Warner & Swasey Co., The, Cleveland.

LEATHER—Cup
Chicago (Ill.) Rawhide Mfg. Co., 1312 Elston Ave.

LEVELING MACHINES
Schmitt Mfg. Co., The, Poughkeepsie, N. Y.
Wean Engineering Co., Inc., The, Warren, Ohio.

LIMESTONE—Low Silica
Baker, J. E., Co., York, Pa.

LINERS, CYLINDER—Bronze and Brass
Paper & Textile Mchy. Co., The, Sandusky, Ohio.

LOCKS
Yale & Towne Mfg. Co., Stamford, Conn.

LOCOMOTIVES—Electric
Atlas Car & Mfg. Co., Cleveland.
General Electric Co., Schenectady, N. Y.

LOCOMOTIVES—Gasoline
Plymouth (O.) Locomotive Wks.

LOCOMOTIVES—Industrial
Plymouth (O.) Locomotive Wks.

LOCOMOTIVES—Steam
American Locomotive Co., 30 Church St., N. Y. C.

LOCOMOTIVES—Storage Battery
Atlas Car & Mfg. Co., Cleveland.

LUBRICANTS—Crusher & Grinding
Pennsylvania Lubricating Co., Pittsburgh.
Sun Oil Co., Philadelphia.
Vacuum Oil Co., 61 B'way, N. Y. C.

LUBRICANTS—Gear
Pennsylvania Lubricating Co., Pittsburgh.
Sun Oil Co., Philadelphia.
Vacuum Oil Co., 61 B'way, N. Y. C.

LUBRICANTS—High Pressure & Temperature
Pennsylvania Lubricating Co., Pittsburgh.
Sun Oil Co., Philadelphia.
Vacuum Oil Co., 61 B'way, N. Y. C.

LUBRICANTS—Mine Cars
Pennsylvania Lubricating Co., Pittsburgh.
Sun Oil Co., Philadelphia.
Vacuum Oil Co., 61 B'way, N. Y. C.

LUBRICANTS—Mining Machines
Pennsylvania Lubricating Co., Pittsburgh.
Sun Oil Co., Philadelphia.
Vacuum Oil Co., 61 B'way, N. Y. C.

LUBRICANTS—Railroad
Pennsylvania Lubricating Co., Pittsburgh.
Sun Oil Co., Philadelphia.
Vacuum Oil Co., 61 B'way, N. Y. C.

LUBRICANTS—Roll Neck—Anti-Friction & Plain
Pennsylvania Lubricating Co., Pittsburgh.
Sun Oil Co., Philadelphia.
Vacuum Oil Co., 61 B'way, N. Y. C.

LUBRICANTS—Tipple & Cleaning
Pennsylvania Lubricating Co., Pittsburgh.
Sun Oil Co., Philadelphia.
Vacuum Oil Co., 61 B'way, N. Y. C.

LUGS—Terminal
Wolverine Tube Co., Detroit.

LUMBER—Creosoted or Zinc Treated
Century Wood Preserving Co., Pittsburgh.

MACHINE TOOL DRIVES
Chilman Wheel Co., 1040 Altgeld St., Chicago, Ill.

MACHINE WORK
Chandler Mch. Wks., 20 Summer St., Fitchburg, Mass.
Fairchild Steel Prods. Co., Wheeling, W. Va.
General Mchy. Works, York, Pa.
Mesker Bros. & Mch. Co., Kaukauna, Wis.

MACHINERY DEALERS
Breitenbach, Percy M., & Son, 25 Church St., N. Y. C.
Delta Equipment Co., Philadelphia.
Donahoe Steel Products Co., 2109 West 74th St., Chicago.
Eastern Mchy. Co., Conn.
Emerman, Louis E., & Co., Chicago.
Iroquois Mchy. Co., 626 Ohio St., Buffalo, N. Y.
Kent, J. L., & Son, Inc., Bridgeport, Conn.
Muir-Galbraith Mchy. Co., Pittsburgh.
Miles Mchy. Co., Saginaw, W. S., Mich.
Mosser, J. N., Philadelphia.
O'Brien Machinery Co., Philadelphia.
Rockford (Ill.) Power Machinery Co., 623 Sixth St.
Ryerson, Joseph T., & Son, Inc., Chicago.
Simmons Mch. Tool Corp., Albany, N. Y.
White, A. D., Machry. Co., Chicago.

MACHINISTS—Contracting
Koenigshof, Otto, Mfg. Co., Cleve.

MAGNESITE—Brick or Dead Burnt
Carborundum Co., The, Niagara Falls, N. Y.
Lisle, E. J., & Co., Philadelphia.

MAGNESIUM
Dow Chemical Co., Midland, Mich.

MAGNETS—Electro Industrial
Dings Magnetic Separator Co., Milwaukee.

MAGNETS—Lifting
Electric Controller & Mfg. Co., Cleve.
Ohio Electric Mfg. Co., The, 5098 Maurice Ave., Cleveland.

MALLETS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., 1312 Elston Ave.

MANGANESE METAL
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.
Metal & Thermit Corp., 120 B'way, N. Y. C.

MANIFOLDS—Oxygen
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

MARKING MACHINES
American Numbering Mch. Co., 224 Shepherd Ave., Brooklyn, N. Y.
Noble & Westbrook Mfg. Co., Hartford, Ct.

METAL PARTS—Rubber Covered
American Hard Rubber Co., 11 Mercer St., N. Y. C.

METAL SPECIALTIES
Adams, S. G., Metalware Co., St. Louis, Mo.
Amer. Spring & Mfg. Corp., Holley Mch. Bassett Corp., The, Utica, N. Y.
Crosby Co., The, Buffalo, N. Y.
Cleveland Spring Co., Cleve.
Geuder, Paeschke & Frey Co. (Contract Mfg. Div.), Milwaukee.
Lansing (Mich.) Stamping Co., So. Penn Ave.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Torrington (Ct.) Co.
Truscon Steel Co., Pressed Steel Div., Cleveland.
Worcester (Mass.) Stamped Metal Co.

METALS—Acid and Corrosion Resistant
Haynes Stellite Co., 30 East 42nd St., N. Y. C.

METERS—Gas or Air
Roots - Connersville - Wilbraham, Connersville, Ind.

MICROSCOPES—Toolmakers
Bausch & Lomb Optical Co., Rochester, N. Y.

MILLING MACHINES—Horizontal
Defiance (O.) Mch. Wks.

MILLING MACHINES—Planer Type
Schiess-Defries, A.-G., Düsseldorf, Germany.

MILLING MACHINES—Second Hand
Bolzinik Bros., Inc., New Haven, Conn.
Eastern Mchy. Co., Conn.
Emerman, Louis E., & Co., Chicago.
Simmons Mch. Tool Corp., Albany, N. Y.

MILLING MACHINES—Universal
Brown & Sharpe Mfg. Co., Prov., R. I.

MIXERS—Laboratory
National Engineering Co., Chicago.

MIXING MACHINES—Sand
National Engineering Co., Chicago.

MOLDING MACHINES—Jarring (Air)
Arcade Mfg. Co., Freeport, Ill.
Herman Pneumatic Mch. Co., Pittsburgh.

MOLDING MACHINES—Rollover (Hand and Power Operated)
Arcade Mfg. Co., Freeport, Ill.
Herman Pneumatic Mch. Co., Pittsburgh.

MONEL METAL
International Nickel Co., Inc., 67 Wall St., N. Y. C.

MONORAIL SWITCHES AND TURNTABLES
Yale & Towne Mfg. Co., Stamford, Conn.

MOTORS—Electric
Allis-Chalmers Mfg. Co., Milwaukee.
Century Electric Co., St. Louis, Mo.
Lincoln Electric Co., Cleveland.
Ohio Electric Mfg. Co., The, 5098 Maurice Ave., Cleveland.

MOTORS—Electric—Fractional H. P.
Ohio Electric Mfg. Co., The, 5098 Maurice Ave., Cleveland.

MOTORS—Electric, Second-Hand
Belyea Co., Inc., 147 W. 24th St., N. Y.
Bolzinik Bros., New Haven, Conn.
Delta Equipment Co., Philadelphia.
O'Brien Machinery Co., Philadelphia.

NAILS—Cut
Reading Iron Co., Philadelphia.

NAILS—Wire
American Steel & Wire Co., Chicago.
Bethlehem (Pa.) Steel Company.
Pittsburgh (Pa.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co.

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International Nickel Co., Inc., 67 Wall St., N. Y. C.

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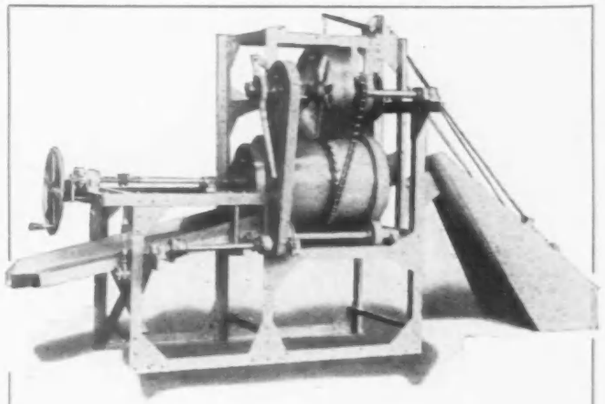

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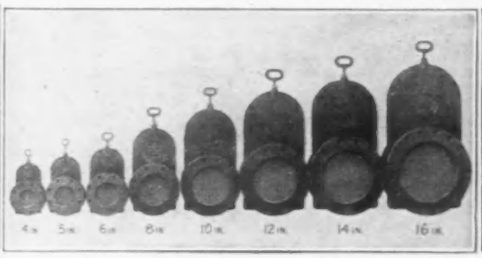

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Chicago Cleveland Detroit Indianapolis Columbus Montreal Toronto

Products Index

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Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

NUMBERING MACHINES—For Metal
American Numbering Mch. Co., 224 Shepherd Ave., Brooklyn, N. Y.
Noble & Westbrook Mfg. Co., Hartford, Ct.

NUT MAKING MACHINERY
Budd-Ranney Engineering Co., The, Columbus, Ohio.
National Mchry. Co., Tiffin, Ohio.

NUTS—Acorn
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Castellated
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Cold Punched
Buffalo Bolt Co., No. Tonawanda, N. Y.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Hot Pressed
Buffalo Bolt Co., No. Tonawanda, N. Y.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Milled
Ferry Cap & Set Screw Co., Cleveland.

NUTS—Semi-Finished
Buffalo Bolt Co., No. Tonawanda, N. Y.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Thumb Malleable
Philadelphia (Pa.) Hardware & Malleable Iron Wks., Inc.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

OIL RETAINERS
Chicago (Ill.) Rawhide Mfg. Co., 1313 Elston Ave.

OIL STONES
Carborundum Co., The, Niagara Falls, N. Y.

OILS—Soluble—See Oils—Cutting

OILS—Cutting
Pennsylvania Lubricating Co., Pittsburgh.
Sun Oil Co., Philadelphia.
Vacuum Oil Co., 61 B'way, N. Y. C.

OILS—Fuel
Sun Oil Co., Philadelphia.
Vacuum Oil Co., 61 B'way, N. Y. C.

OILS—Lubricating
Vacuum Oil Co., 61 B'way, N. Y. C.

ORES—Chrome, Lump and Ground
Lavino, E. J., & Co., Philadelphia.

ORES—Iron
Cleveland (Ohio) Cliffs Iron Co.
Hanna Furnace Corp., The, Detroit, Mich
Pickands Mather & Co., Cleveland.
Shenango Furnace Co., Pittsburgh
Snyder, W. P., & Co., Pittsburgh.

ORES—Manganese
Lavino, E. J., & Co., Philadelphia.

OVENS—Baking
Young Bros. Co., Detroit.

OVENS—Coke and By-Product Recovery
Koppers Construction Co., The, Pittsburgh.

OVENS—Core and Mold
Crawford Oven Co., The, 203 Shelton Ave., New Haven, Conn.
Gehnrich Oven Co., Inc., Long Island City, N. Y.
Holcroft & Co., Detroit.
Maehler, Paul, Co., The, Chicago.
Young Bros. Co., Detroit.

OVENS—Cross Regenerative
Koppers Construction Co., The, Pitgh.

OVENS—Drying
Crawford Oven Co., The, 203 Shelton Ave., New Haven, Conn.
Young Bros. Co., Detroit.

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OVERHEAD CARRYING EQUIPMENT —See Monorail—Overhead

OXY-ACETYLENE — Shape-Cutting Machines
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

OXYGEN
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

PACKING—Leather
Chicago (Ill.) Rawhide Mfg. Co., 1313 Elston Ave.
Watson-Stillman Co., 103 Aldene Rd., Roselle, N. J.

PACKING—Metallic
Garlock Packing Co., The, Palmyra, N. Y.

PACKING—RUBBER
Goodrich, B. F., Rubber Co., Akron, O.

PACKING—Sheet, Asbestos or Rubber
Garlock Packing Co., The, Palmyra, N. Y.

PERFORATED METAL
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chi.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

PHOSPHOR—Copper
Phosphor Bronze Smelting Co., Philadelphia.

PHOTO MICROGRAPHIC APPARATUS
Bausch & Lomb Optical Co., Rochester, N. Y.

PICKLING COMPOUNDS
American Chemical Paint Co., Ambler, Pa.

PICKLING MACHINES
Mesta Machine Co., Pittsburgh.

PIG IRON
Bethlehem (Pa.) Steel Company.
Cleveland (Ohio) Cliffs Iron Co.
Hanna Furnace Corp., The, Detroit, Mich
Lavino, E. J., & Co., Philadelphia.
Pickands Mather & Co., Cleveland.
Republic Steel Corp., Youngstown, Ohio.
Shenango Furnace Co., Pittsburgh.
Shenango-Penn Mold Co., Pittsburgh.
Superior Charcoal Iron Co., Grand Rapids, Mich.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

PIG IRON—Charcoal
Superior Charcoal Iron Co., Grand Rapids, Mich.

PILING—Steel Sheet
Bethlehem (Pa.) Steel Company
Jones & Laughlin Steel Corp., Pittsburgh.

PINIONS—Rolling Mill
Mesta Machine Co., Pittsburgh.

PINIONS—Wire and Rod
Rathbone, A. B. & J., Palmer, Mass.

PINS—Airbrake
Champion Rivet Co., Cleveland, Ohio.

PIPE—Brass or Copper
American Brass Co., Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

PIPE—Cast Iron, B. & S. and Flanged
Wood, R. D., Co., Philadelphia.

PIPE—Fusion Welded
Petroleum Iron Wks., Co., Sharon, Pa.

PIPE—Genuine Wrought Iron
Reading Iron Co., Philadelphia.

PIPE—Hammer Welded
National Tube Co., Pittsburgh.

PIPE—New and Second-Hand
Albert & Davidson Pipe Corp., 2nd Ave., 50-51st St., Bklyn., N. Y.
Albert Pipe Supply Co., Inc., Berry and N. 13th St., Bklyn, N. Y.
Greenpoint Iron & Pipe Co., Inc., 187-197 Maspeth Ave., Bklyn, N. Y.

PIPE—Riveted Steel
McClintic-Marshall Co., Bethlehem, Pa.

PIPE—Spiral Welded
American Rolling Mill Co., Middletown, O.

PIPE—Standard, Black and Galvanized
Bethlehem (Pa.) Steel Company.
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co., Pittsburgh.
Republic Steel Corp., Youngstown, Ohio.
Youngstown (Ohio) Sheet & Tube Co.

PIPE, STEEL—Rubber Lined
American Hard Rubber Co., 11 Mercer St., N. Y. C.

PIPE—Welded, Electric
Republic Steel Corp., Youngstown, Ohio.

PIPE—Wrought Iron
Byers, A. M., Co., Pittsburgh.

PIPE CUTTING AND THREADING MACHINES
Bignall & Keeler Mch. Wks., Edwardsville Ill.
Jarecki Mfg. Co., Erie, Pa.
Landis Mach. Co., Inc., Waynesboro, Pa
Merrell Mfg. Co., Toledo.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

PIPE FITTINGS
Jarecki Mfg. Co., Erie, Pa.

PLANING MACHINES—Metal
Schloss-Defries, A.-G., Dusseldorf, Germany.

PLANNING MACHINES—Second Hand
Miles Mchry. Co., Saginaw, W. S., Mich.

PLATERS' CLEANING COMPOUND
American Chemical Paint Co., Ambler, Pa.

PLATES—Floor or Cellar Door
Carnegie Steel Co., Pittsburgh.
Central Iron & Steel Co., Harrisburg, Pa.

PLATES—Iron or Steel
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Company
Carnegie Steel Co., Pittsburgh.
Central Iron & Steel Co., Harrisburg, Pa
Granite City (Ill.) Steel Co.
Illinois Scully Steel Warehouse Co., Chicago, Ill.
Illinois Steel Co., Chicago.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Joseph T., & Sons, Inc., Chicago
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co.

PLATES—Wrought Iron
Byers, A. M., Co., Pittsburgh.

PLUGS—Core Hole
Hubbard, M. D., Spring Co., Pontiac, Mich.

PLUGS—Expansion
Wrought Washer Mfg. Co., Milwaukee.

POLISHING MACHINES—Belt
Production Machine Co., Greenfield, Mass.

PRESS ATTACHMENTS
Littell, F. J., Mach. Co., Chicago.

PRESSED METAL PARTS
Adams, S. G., Metalware Co., St. Louis, Mo.
Champion Sheet Metal Co., Inc., Cortland, N. Y.
Crosby Co., The, Buffalo, N. Y.

PRESSED STEEL PARTS
Bossert Corp., Inc., Utica, N. Y.
Crosby Co., The, Buffalo, N. Y.
Geuder, Paeschke & Frey Co. (Contract Mfg. Div.), Milwaukee.
Lansing (Mich.) Stamping Co., So. Penn Ave.
Parish Pressed Steel Co., Reading, Pa
Pressed & Welded Steel Prods. Co., Long Island City, N. Y.
Truscon Steel Co. Pressed Steel Div., Cleveland.

PRESSES—Drop—See Hammers—Drop

PRESSES—Baling
Standard Mchry. Co., Auburn, N. Y.

PRESSES—Bending or Straightening
Watson-Stillman Co., 103 Aldene Rd., Roselle, N. J.

PRESSES—Coining
Bliss, E. W., Co., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Cleveland (Ohio) Punch & Shear Wks. Co.
National Mchry. Co., Tiffin, Ohio.

PRESSES—Die
Watson-Stillman Co., 103 Aldene Rd., Roselle, N. J.

PRESSES—Extrusion
Cleveland (Ohio) Punch & Shear Wks. Co.
Prosser, Thomas, & Son, Widia Dept., 15 Gold St., N. Y. C.
Robertson, John, Co., 123 Water St., Brooklyn, N. Y.
Watson-Stillman Co., 103 Aldene Rd., Roselle, N. J.

PRESSES—Foot
Baird Machine Co., Bridgeport, Conn.

PRESSES—Forging
Lucas Mch. Tool Co., Cleve.
Watson-Stillman Co., 103 Aldene Rd., Roselle, N. J.

PRESSES—Forging
Cleveland (Ohio) Punch & Shear Wks. Co.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Mesta Machine Co., Pittsburgh.
Morgan Engineering Co., Alliance, O.

PRESSES—Forming and Bending
Cincinnati (Ohio) Shaper Co.
Cleveland (Ohio) Punch & Shear Wks. Co.
Dreis & Krump Mfg. Co., Chicago.
Streine Tool & Mfg. Co., New Bremen, O.

PRESSES—Friction Screw
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Zeh & Hahnemann Co., Newark, N. J.

PRESSES—Hot and Cold Plate
Watson-Stillman Co., 103 Aldene Rd., Roselle, N. J.

PRESSES—Hydraulic
Elmes, Chas. F., Engrg. Works, Chicago
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Lake Erie Engng. Corp., 68 Kenmore Sta., Buffalo, N. Y.
Mesta Machine Co., Pittsburgh.
Morgan Engineering Co., Alliance, O.
Robertson, John, Co., 123 Water St., Brooklyn, N. Y.
Watson-Stillman Co., 103 Aldene Rd., Roselle, N. J.
Wood, R. D., Co., Philadelphia.

PRESSES—Power
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Cincinnati (Ohio) Shaper Co.
Cleveland (Ohio) Punch & Shear Wks. Co.
Dreis & Krump Mfg. Co., Chicago, Ill.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hyman, Joseph, & Sons, Phila.
Manville, E. J., Mach. Co., Waterbury, Ct.
New Albany (Ind.) Mch. Mfg. Co.
Niagara Machine & Tool Works, Buffalo N. Y.
Pels, Henry, & Co., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Standard Machinery Co., Auburn, N. Y.
Toledo (O.) Mach. & Tool Co.
V & O Press Co., Hudson, N. Y.
Zeh & Hahnemann Co., Newark, N. J.

PRESSES—Roofing and Corrugating
Streine Tool & Mfg. Co., New Bremen, O.

PRESSES—Trimming
Cleveland (Ohio) Punch & Shear Wks. Co.
Erie (Pa.) Foundry Co.
Toledo (O.) Mch. & Tool Co.

PROJECTORS—Contour Measuring
Bausch & Lomb Optical Co., Rochester, N. Y.

PULLEYS—Magnetic
Magnetic Mfg. Co., 626 So. 28th St., Milwaukee, Wis.

PUMPS—Boiler Feed
Deming Co., The, Salem, Ohio.

PUMPS—Centrifugal
Roots-Connersville-Wilbraham, Connersville, Ind.

PUMPS—Electric
Deming Co., The, Salem, Ohio.

PUMPS—Hand & Power
Deming Co., The, Salem, Ohio.

PUMPS—Hydraulic
American Fluid Motors Co., 2410 Aramingo Ave., Philadelphia.
Elmes, Chas. F., Engrg. Works, Chicago.
Vickers, Inc., Detroit.
Watson-Stillman Co., 103 Aldene Rd., Roselle, N. J.
Wood, R. D., Co., Philadelphia.

PUMPS—Rotary
Vickers, Inc., Detroit.

PUMPS—Rotary Positive
Paper & Textile Mchry. Co., The, Sandusky, Ohio.
Roots-Connersville-Wilbraham, Connersville, Ind.

PUNCHES AND DIES
Cleveland (Ohio) Punch & Shear Wks. Co.
Marchant, Geo. F., Co., Chicago.

PUNCHING AND SHEARING MACHINES
Bertsch & Co., Cambridge City, Ind.
Cincinnati (Ohio) Shaper Co.
Cleveland (Ohio) Punch & Shear Wks. Co.
Excelsior Tool & Mch. Co., E. St. Louis, Ill.
Pels, Henry, & Co., 90 West St., N. Y. C.
Ryerson, Jos. T., & Son, Inc., Chicago.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Thomas Spacing Mach. Co., Pitgh.

PYROMETERS—Indicating
Bristol Co., Waterbury, Conn.
Hoskins Mfg. Co., Detroit, Mich.

RAIL SPLICE BARS
Ames, W., & Co., Jersey City, N. J.

RAILS
Bethlehem (Pa.) Steel Company.
Frank, M. K., 220 East 42nd St., N. Y. C.
Illinois Steel Co., Chicago.
Inland Steel Co., Chicago.
Robinson & Orr, Pittsburgh.
Ryerson, Jos. T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Weirton (W. Va.) Steel Co.

RAILS—Relaying
Frank, M. K., 220 East 42nd St., N. Y. C.
Hyman-Michaels Co., Chicago.
Weiss, B. M., Philadelphia.

REAMERS
Cleveland (Ohio) Twist Drill Co.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Hartford, Conn.

REFRACTORIES—See Brick—Cement—Facing Clay and Fire Clay

REGULATORS—Compressed Gas
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

REINFORCEMENT FABRIC—Concrete
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

RINGS—Iron or Steel
Midvale Co., The, Nicetown, Phila., Pa.

RINGS—Welded
American Welding & Mfg. Co., Warren, O.

RIVET MAKING MACHINERY
Acme Machinery Co., Cleve.
Manville, E. J., Mach. Co., Waterbury, Ct.
National Mchry. Co., Tiffin, Ohio.

RIVET SETS
Cleveland (Ohio) Punch & Shear Wks. Co.
Marchant, Geo. F., Co., Chicago.

RIVETING MACHINES
Shuster, F. B., Co., New Haven, Conn
Wood, R. D., Co., Philadelphia.

RIVETS
Bethlehem (Pa.) Steel Company.
Champion Rivet Co., Cleveland, Ohio
Clark Bros. Bolt Co., Milldale, Conn.
Oliver Iron & Steel Corp., Pittsburgh.
Progressive Mfg. Co., Torrington, Conn.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago.

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Products Index

RODS—Brass, Bronze, Copper or Nickel Silver
American Brass Co., Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

RODS—Drill
Pittsburgh Tool Steel Wire Co., Monaca, Pa.

RODS—Magnesium Alloys
Dow Chemical Co., Midland, Mich.

RODS—Nickel Silver
Seymour (Conn.) Mfg. Co.

RODS—Phosphor Bronze
American Brass Co., Waterbury, Conn.
Phosphor Bronze Smelting Co., Philadelphia.
Seymour (Conn.) Mfg. Co.

RODS—Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
American Brass Co., Waterbury, Conn.
American Steel & Wire Co., Chicago.
Haynes Stellite Co., 30 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.
Metal & Thermit Corp., 120 B'way, N. Y. C.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Wilson Welder & Metals Co., Inc., North Bergen, N. J.

RODS—Wire
American Steel & Wire Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Washburn Wire Co., Inc., 118th & Harlem River, N. Y. C.
Washburn Wire Co., Phillipsdale, R. I.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
Youngstown (Ohio) Sheet & Tube Co.

ROLLING MACHINERY—Cold Rolling
Bliss, E. W., Co., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Kane & Roath, Syracuse, N. Y.
McKinney Tool & Mfg. Co., Cleveland.
United Engng. & Fdry. Co., Pittsburgh.

ROLLING MACHINERY—Corrugating
Streine Tool & Mfg. Co., New Bremen, O.

ROLLING MACHINERY—Sheet Leveler
Streine Tool & Mfg. Co., New Bremen, O.

ROLLING MACHINERY—Sheet Metal
Streine Tool & Mfg. Co., New Bremen, O.

ROLLING MACHINERY—Sheet Oiling
Streine Tool & Mfg. Co., New Bremen, O.

ROLLING MILL MACHINERY
Bliss, E. W., Co., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Demag Corp., Duisburg, Germany.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hyde Park (Pa.) Fdry. & Mch. Co.
Mackintosh-Hemphill Co., Pittsburgh.
Mesta Machine Co., Pittsburgh.
Morgan Construction Co., Worcester, Mass.
Morgan Engng. Co., Alliance, Ohio.
National Roll & Fdry. Co., Avonmore, Pa.
Prosser, Thomas, & Son, Widia Dept., 15 Gold St., N. Y. C.
Standard Machinery Co., Auburn, R. I.
United Engng. & Fdry. Co., Pittsburgh.

ROLLS—Alloy Steel
Pittsburgh (Pa.) Rolls Corp.

ROLLS—Bending and Straightening
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Bertsch & Co., Cambridge City, Ind.
Cleveland (Ohio) Punch & Shear Wks. Co.
Lake Erie Engng. Corp., 68 Kenmore Sta., Buffalo, N. Y.
Mat-halltown (Iowa) Mfg. Co.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

ROLLS—Brass, Bronze, Copper, Iron, Monel, Aluminum
Paper & Textile Mchry. Co., The, Sandusky, Ohio.

ROLLS—Sand Chilled Iron and Steel
Hyde Park (Pa.) Fdry. & Mach. Co.
Mesta Machine Co., Pittsburgh.
National Roll & Fdry. Co., Avonmore, Pa.
Pittsburgh (Pa.) Rolls Corp.
United Engng. & Fdry. Co., Pittsburgh.

ROLLS—Special Hardened
Bethlehem (Pa.) Steel Company.
Midvale Co., The, Nicetown, Phila., Pa.
Prosser, Thomas, & Son, Widia Dept., 15 Gold St., N. Y. C.

ROOFING—Special Copper Bearing Steel
Newport (Ky.) Rolling Mill Co.

ROOFING AND SIDING—Corrugated and Plain
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pgh.
Byers, A. M., Co., Pittsburgh.
Newport (Ky.) Rolling Mill Co.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co.

ROOFING AND SIDING—Genuine Open Hearth Iron
Newport (Ky.) Rolling Mill Co.

ROOFING AND SIDING—Iron and Steel
Newport (Ky.) Rolling Mill Co.

ROOFING AND SIDING—Wrought Iron
Byers, A. M., Co., Pittsburgh.

ROOFING AND SIDING—(Zinc) Corrugated and Plain
New Jersey Zinc Co., Inc., The, 160 Front St., N. Y. C.

RUBBER LININGS—Tank
American Hard Rubber Co., 11 Mercer St., N. Y. C.
Goodrich, B. F., Rubber Co., Akron, O.

RUBBER MOLDED PARTS
American Hard Rubber Co., 11 Mercer St., N. Y. C.

RUST PREVENTIVES
American Chemical Paint Co., Ambler, Pa.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING COMPOUNDS
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.

RUST REMOVING
American Chemical Paint Co., Ambler, Pa.
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

SAND—Sand Blast
Cape May (N. J.) Sand Co.
Patch-Wegner Co., Inc., Rutland, Vt.

SAND—Steel Molding
Cape May (N. J.) Sand Co.

SAND BLAST EQUIPMENT AND MACHINES
American Foundry Equip. Co., Inc., Mishawaka, Ind.
Arcade Mfg. Co., Freeport, Ill.

SAND BLAST STEEL SHOT
Pittsburgh (Pa.) Crushed Steel Co.

SAND HANDLING EQUIPMENT
Hayward Co., The, 50 Church St., N. Y. C.
National Engineering Co., Chicago.

SAND MILLS
National Engineering Co., Chicago.

SASH—Steel
Truscon Steel Co., Youngstown, Ohio.

SAWING MACHINES—Band for Wood or Metal
Victor Saw Works, Inc., Middletown, N. Y.

SAWING MACHINES—Metal
Earle Gear & Mch. Co., Phila.
Layer-Lucas Mach. Works, Phila.
McKinney Tool & Mfg. Co., Cleveland.

SAWS—Band and Hack for Metal
Armstrong-Blum Mfg. Co., Chicago.

SAWS—Hack Saw Blades
Armstrong-Blum Mfg. Co., Chicago.
Victor Saw Works, Inc., Middletown, N. Y.

SAWS—Inserted Tooth, Cold
Talor Mfg. Co., Philadelphia.

SCREENS—Perforated Metal
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chi.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.

SCREENS—Woven Wire
Cleveland (O.) Wire Cloth & Mfg. Co.
Michigan Wire Cloth Co., 2117 Howard St., Detroit.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Bristol, Conn.
Commonwealth Brass Corp., Detroit.
Eastern Mch. Screw Corp., New Haven, Ct.
Ferry Cap & Set Screw Co., Cleveland.
Olson Mfg. Co., Worcester, Mass.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Progressive Mfg. Co., Torrington, Conn.
Screw Mch. Products Corp., Flor., R. I.

SCREW MACHINERY—Automatic
Cone Automatic Mach. Co., Inc., Windsor, Vt.

SCREW MACHINERY—Hand
Jones & Lamson Mch. Co., Springfield, Vt.
Warner & Swasey Co., The, Cleveland

SCREW MACHINERY—Multiple Spindle
Cone Automatic Mach. Co., Inc., Windsor, Vt.

SCREW STOCKS
Union Drawn Steel Co., Beaver Falls, Pa.

SCREWS—CAP
Clark Bros. Bolt Co., Millidale, Conn.
Ferry Cap & Set Screw Co., Cleveland.
Ottemiller, Wm. H., Co., Inc., York, Pa.

SCREWS—Machine
Progressive Mfg. Co., The, Hartford, Conn.

SCREWS—Safety Set
Allen Mfg. Co., The, Hartford, Ct.
Bristol Co., Waterbury, Conn.
Progressive Mfg. Co., The, Hartford, Conn.
Standard Pressed Steel Co., Jenkintown, Pa.
Strong, Carlisle & Hammond Co., Cleve.

SCREWS—Set
Ferry Cap & Set Screw Co., Cleveland.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Strong, Carlisle & Hammond Co., Cleve.

SCREWS, Socket, Head, Cap
Allen Mfg. Co., The, Hartford, Ct.
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Thumb Malleable
Philadelphia (Pa.) Hardware & Malleable Iron Wks., Inc.

SCRUBBING MACHINES—Sheet
Wean Engineering Co., Inc., The, Warren, Ohio.

SCYTHE STONES AND WHETSTONES
Carborundum Co., The, Niagara Falls, N. Y.

SECOND-HAND MACHINERY — See Clearing House Section
Armel, James P., Pittsburgh.
Botwinik Bros., Inc., New Haven, Conn.
Brotherhood, Percy M., & Son, 25 Church St., N. Y. C.
Donahue Steel Products Co., 1609 West 74th St., Chicago.
Eastern Mchry. Co., Cinn.
Emetman, Louis E., & Co., Chicago.
Highway Truck Parts Corp., Indianapolis, Ind.
Iroquois Mchry. Co., 656 Ohio St., Buffalo, N. Y.
Ivins, Carl E., Co., Erie, Pa.
Lodge & Shipley Mch. Tool Co., Cinci.
Lucas, J. L., & Son, Inc., Bridgeport, Ct.
Marr-Galbraith Mchry. Co., Pittsburgh.
Miles Mchry. Co., Saginaw, W. S. Mich.
O'Brien Machinery Co., Philadelphia.
Production Machinery Sales Co., Inc., Detroit.
Rockford (Ill.) Power Machinery Co, 623 Sixth St.
Ross Power Equip. Co., Indianapolis.
Simmons Mch. Tool Corp., Albany, N. Y.
White, A. D., Machry. Co., Chicago.

SEPARATORS—Magnetic
Dings Magnetic Separator Co., Milwaukee.
Magnetic Mfg. Co., 626 South 28th St., Milwaukee.
Ohio Electric Mfg. Co., The, 5908 Maurice Ave., Cleveland.

SHAFTING—Cold Drawn
Cumberland (Md.) Steel Co.
Union Drawn Steel Co., Beaver Falls, Pa.

SHAFTING—Flexible
Binghamton Flexible Shaft Co., 40 Maple Ave., Johnson City, N. Y.

SHAFTING—Steel
Bliss & Laughlin, Inc., Harvey, Ill.
Cumberland (Md.) Steel Co.
Union Drawn Steel Co., Beaver Falls, Pa.

SHAFTING—Tubular Material For
National Tube Co., Pittsburgh.

SHAFTING—Turned and Ground
Cumberland (Md.) Steel Co.
Moltrup Steel Products Co., Beaver Falls, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago.
Union Drawn Steel Co., Beaver Falls, Pa.

SHAPES—Cold Drawn
Union Drawn Steel Co., Beaver Falls, Pa.

SHAPES—Wire
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Roebling's, John A., Sons Co., Trenton, N. J.
Titchener, E. H., & Co., Binghamton, N. Y.

SHAPING MACHINES—Horizontal
Cincinnati (Ohio) Shaper Co.

SHAPING MACHINES—Vertical
Pratt & Whitney Co., Hartford, Conn.

SHEAR BLADES AND KNIVES
Heppenstall Co., Pittsburgh.
Marshalltown (Iowa) Mfg. Co.

SHEARING MACHINES—Alligator
Pels, Henry, & Co., 90 West St., N. Y. C.

SHEARING MACHINES—Angle, Hand and Power
Cleveland (Ohio) Punch & Shear Wks. Co.
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
Pels, Henry, & Co., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Thomas Spacing Mach. Co., Pgh., Pa.

SHEARING MACHINES—Bar
Cleveland (Ohio) Punch & Shear Wks. Co.
Pels, Henry, & Co., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engng. & Fdry. Co., Pittsburgh.

SHEARING MACHINES — Beam and Channel
Cleveland (Ohio) Punch & Shear Wks. Co.
Pels, Henry, & Co., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engng. & Fdry. Co., Pittsburgh.

SHEARING MACHINES—Billet
Morgan Engineering Co., Alliance, O.
Pels, Henry & Co., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engng. & Fdry. Co., Pittsburgh.

SHEARING MACHINES — Continuous Sheet & Pack
Streine Tool & Mfg. Co., New Bremen, O.

SHEARING MACHINES — Metal Slitting
Pels, Henry, & Co., 90 West St., N. Y. C.

SHEARING MACHINES—Plate
Bertsch & Co., Cambridge City, Ind.
Cincinnati (Ohio) Shaper Co.
Cleveland (Ohio) Punch & Shear Wks. Co.
Dreis & Krump Mfg. Co., Chicago.
Marshalltown (Iowa) Mfg. Co.
Mesta Machine Co., Pittsburgh.
Morgan Engineering Co., Alliance, O.
Pels, Henry, & Co., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Thomas Spacing Mach. Co., Pgh., Pa.
United Engng. & Fdry. Co., Pittsburgh.
Wood, R. D., Co., Philadelphia.

SHEARING MACHINES — Rotary Slitting Gang
Streine Tool & Mfg. Co., New Bremen, O.

SHEARING MACHINES — Sheet and Plate
Cincinnati (Ohio) Shaper Co.
Cleveland (Ohio) Punch & Shear Wks. Co.
Dreis & Krump Mfg. Co., Chicago.
Streine Tool & Mfg. Co., New Bremen, O.

SHEARING MACHINES—Squaring
Cincinnati (Ohio) Shaper Co.
Dreis & Krump Mfg. Co., Chicago.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
Toledo (O.) Mch. & Tool Co.

SHEET BARS
Andrews Steel Co., The, Newport, Ky.
Jones & Laughlin Steel Corp., Pittsburgh.

SHEET METAL MACHINERY
Cincinnati (Ohio) Shaper Co.
Cleveland (Ohio) Punch & Shear Wks. Co.
Dreis & Krump Mfg. Co., Chicago.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Kane & Roach, Syracuse, N. Y.
New Albany (Ind.) Mch. Mfg. Co.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago.
Standard Machinery Co., Auburn, R. I.
Streine Tool & Mfg. Co., New Bremen, O.
Toledo (O.) Machine & Tool Co.
V & O Press Co., Hudson, N. Y.

SHEET METAL WORK
Kelker Blower Co., Inc., Buffalo, N. Y.

SHEETS—Aluminum
Erdle Perforating Co., Rochester, N. Y.

SHEETS—Auto Body
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pgh.
Eastern Rolling Mill Co., Baltimore, Md.
Republic Steel Corp., Youngstown, Ohio.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co.

SHEETS—Black
American Sheet & Tin Plate Co., Pgh.
Bethlehem (Pa.) Steel Company.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Sharon (Pa.) Steel Hoop Co.
Weirton (W. Va.) Steel Co.

SHEETS—Blue Annealed
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Company.
Central Iron & Steel Co., Harrisburg, Pa.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Sharon (Pa.) Steel Hoop Co.
Weirton (W. Va.) Steel Co.

SHEETS—Box Annealed
Newport (Ky.) Rolling Mill Co.

SHEETS—Brass, Bronze, Copper, Nickel Silver or Phosphor Bronze
American Brass Co., Waterbury, Conn.
Phosphor Bronze Smelting Co., Philadelphia.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Seymour (Conn.) Mfg. Co.

SHEETS—Copper Steel
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co.

SHEETS—Electrical
American Rolling Mill Co., Middletown, O.
Newport (Ky.) Rolling Mill Co.
Republic Steel Corp., Youngstown, Ohio.

SHEETS — Enameling Stock (Genuine Open-Hearth Iron)
American Rolling Mill Co., Middletown, O.
Newport (Ky.) Rolling Mill Co.

SHEETS—For Drawing and Stamping
American Rolling Mill Co., Middletown, O.
Newport (Ky.) Rolling Mill Co.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Sharon (Pa.) Steel Hoop Co.
Weirton (W. Va.) Steel Co.

SHEETS—Full Finished
American Rolling Mill Co., Middletown, O.
Newport (Ky.) Rolling Mill Co.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Seneca Iron & Steel Co., Buffalo, N. Y.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co.

SHEETS—Galvanized, Flat and Corrugated
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American Sheet & Tin Plate Co., Pgh.
Bethlehem (Pa.) Steel Company
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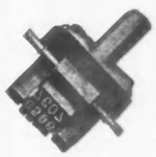

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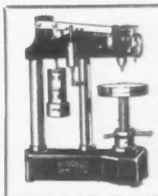

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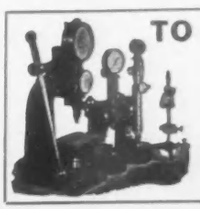

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Timken Steel & Tube Co., The, Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Alloy, Cold Drawn

Moltrup Steel Products Co., Beaver Falls, Pa.
Union Drawn Steel Co., Beaver Falls, Pa.

STEEL—Bright Finished

Union Drawn Steel Co., Beaver Falls, Pa.

STEEL—Carbon

Andrews Steel Co., The, Newport, Ky.
Carnegie Steel Co., Pittsburgh.
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Harrisburg (Pa.) Pipe & Pipe Bending Co.
Latrobe (Pa.) Electric Steel Co.
Prosser, Thomas, & Son, Widia Dept., 15 Gold St., N. Y. C.

STEEL—Carbon Vanadium

Andrews Steel Co., The, Newport, Ky.
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STEEL—Chrome

American Steel & Wire Co., Chicago.
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Manganese

Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Nickel

American Steel & Wire Co., Chicago.
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Pipe & Pipe Bending Co.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Vanadium

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Harrisburg (Pa.) Pipe & Pipe Bending Co.
Latrobe (Pa.) Electric Steel Co.

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Pittsburgh Tool Steel Wire Co., Monaca, Pa.
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Ryerson, Joseph T., & Son, Inc., Chicago.
Union Drawn Steel Co., Beaver Falls, Pa.

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American Steel & Wire Co., Chicago.
American Tube & Stpg. Plant (The Stanley Wks.), Bridgeport, Conn.
Athenia Steel Co., 135 William St., N. Y.
Griffin Mfg. Co., Erie, Pa.
Latrobe (Pa.) Electric Steel Co.
Ryerson, Jos. T. & Son, Inc., Chicago.
Sharon (Pa.) Steel Hoop Co.
Stanley Works, The, New Britain, Conn.
Superior Steel Corp., Grant Bldg., Pgh.
Thomas Steel Co., Warren, Ohio.
Washburn Wire Co., Phillipsdale, R. I.
Washburn Wire Co., 118th St. & Harlem River, N. Y. C.
Weirton (W. Va.) Steel Co.
West Leechburg Steel Co., Pittsburgh.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Cold Rolled Strips, Chrome Nickel

Griffin Mfg. Co., Erie, Pa.

STEEL — Cold Rolled Strips, Copper Coated

Thomas Steel Co., Warren, Ohio.

STEEL—Cold Rolled Strips, Electro-Galvanized

Thomas Steel Co., Warren, Ohio.

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Carpenter Steel Co., 121 W. Bern St., Reading, Pa.

STEEL—Crucible

Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Cutlery

Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.

STEEL—Die

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Ludlum Steel Co., Watervliet, N. Y.

STEEL—Drill

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Ludlum Steel Co., Watervliet, N. Y.

STEEL—Electric

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Ludlum Steel Co., Watervliet, N. Y.
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Timken Steel & Tube Co., The, Canton, O.

STEEL—High Speed

Bethlehem (Pa.) Steel Company.
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
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Ludlum Steel Co., Watervliet, N. Y.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Hot Rolled Strips

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American Tube & Stpg. Plant (The Stanley Wks.), Bridgeport, Conn.
Laclede Steel Co., St. Louis, Mo.
Latrobe (Pa.) Elec. Steel Co.
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Stanley Works, The, New Britain, Ct.
Superior Steel Corp., Grant Bldg., Pgh.
Weirton (W. Va.) Steel Co.
West Leechburg Steel Co., Pittsburgh.

STEEL—Magnet

Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Latrobe (Pa.) Elec. Steel Co.

STEEL—Nickel

Andrews Steel Co., The, Newport, Ky.

STEEL—Open Hearth

Andrews Steel Co., The, Newport, Ky.
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Timken Steel & Tube Co., The, Canton, O.

STEEL—Rustless

Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.

STEEL—Screw

Timken Roller Bearing Co., Canton, Ohio.
Timken Steel & Tube Co., The, Canton, O.
Union Drawn Steel Co., Beaver Falls, Pa.

STEEL—Special Analysis

Andrews Steel Co., The, Newport, Ky.
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Timken Roller Bearing Co., Canton, Ohio.
Timken Steel & Tube Co., The, Canton, O.
West Leechburg Steel Co., Pittsburgh.

STEEL—Spring

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Barnes, Wallace, Co., The, Bristol, Conn.
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Timken Steel & Tube Co., The, Canton, O.

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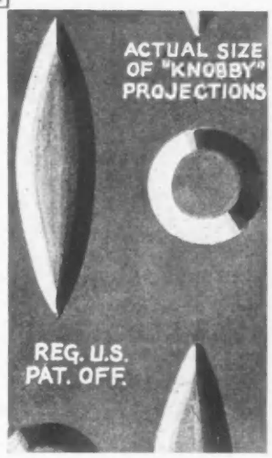

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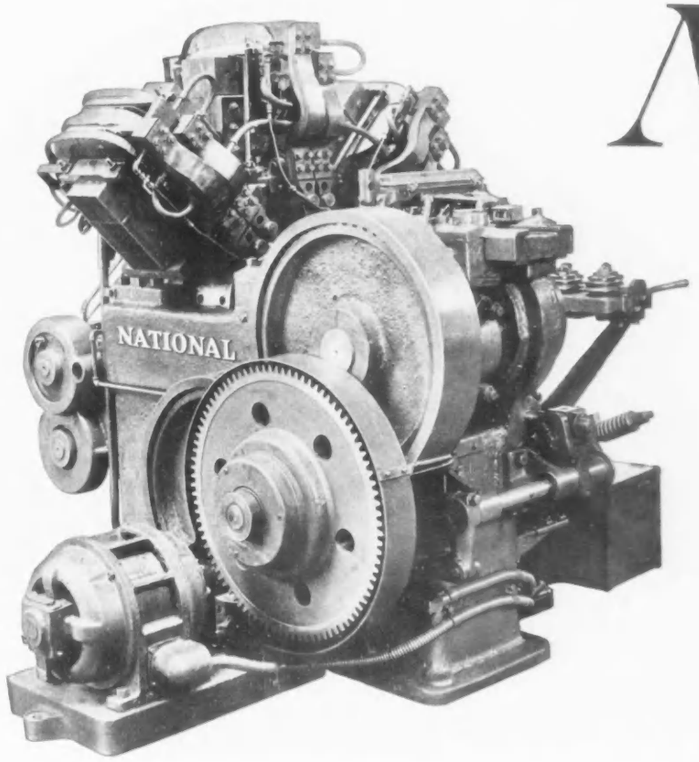

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